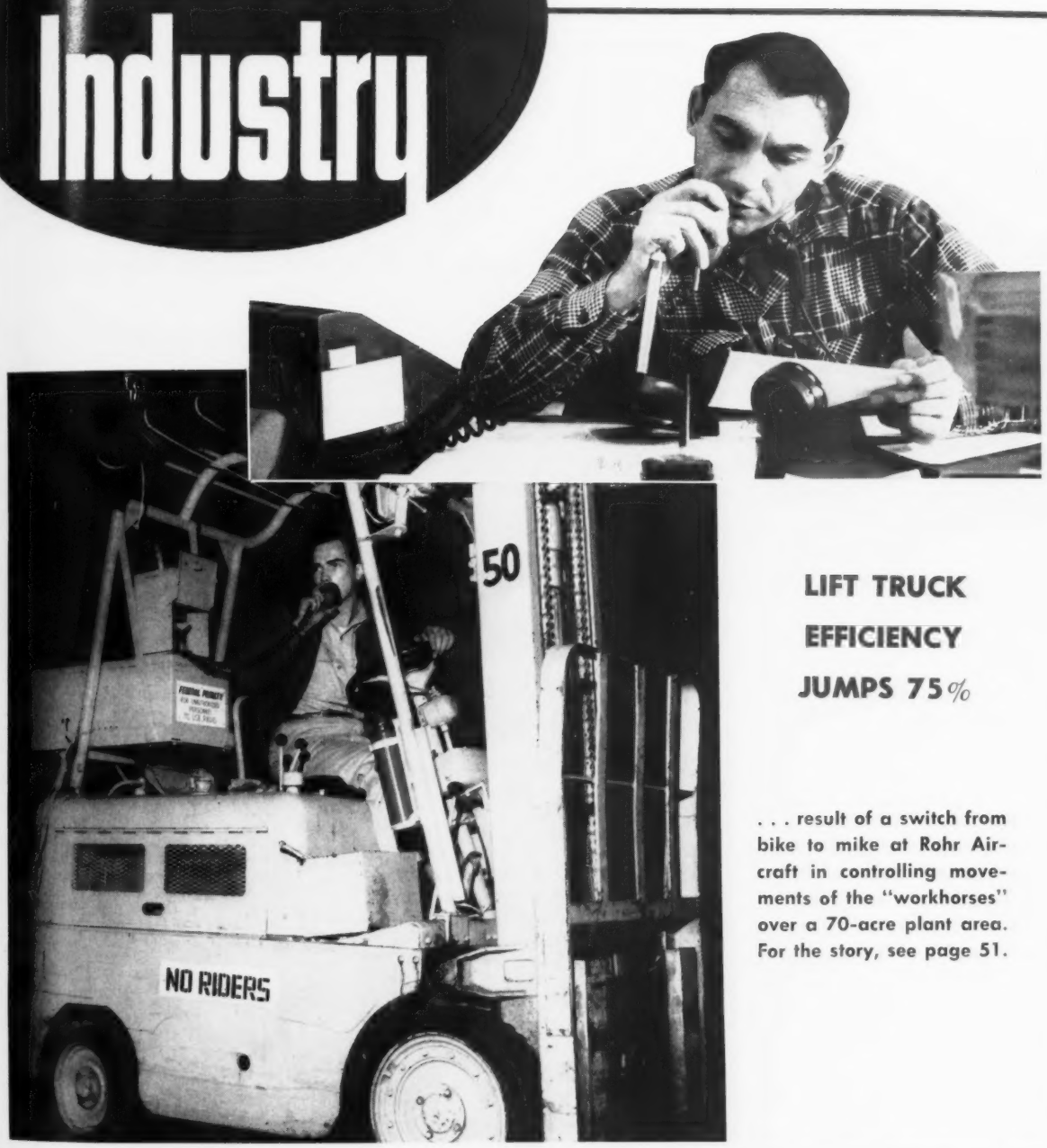
Western Industry

March 1956



LIFT TRUCK EFFICIENCY JUMPS 75%

. . . result of a switch from bike to mike at Rohr Aircraft in controlling movements of the "workhorses" over a 70-acre plant area. For the story, see page 51.

TRAIN 'EM YOURSELF—How Western plants are meeting acute needs for skilled manpower, p. 37

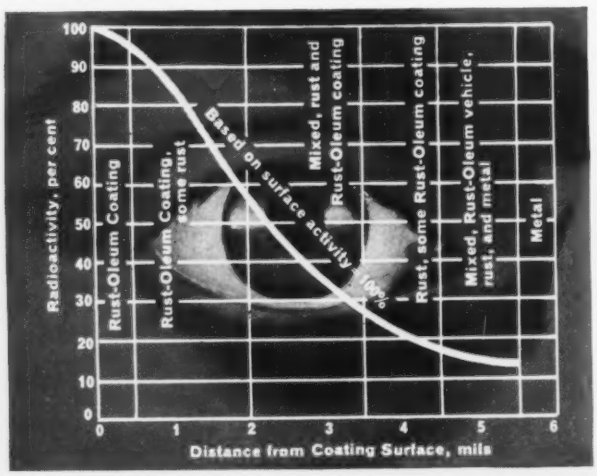
PLAST C PIPE POINTERS — Hard-learned facts from a N. Mex. uranium mill's experience, p. 42

HOW ORD DID IT! — From $3,000,000 damage to full operation in just 5 working days, p. 46

50 ELECTRIC MOTOR MANUALS—yours for the asking . . . page 65

See **RUST-OLEUM.**

penetrate rust to bare metal through the "eyes" of radioactivity!



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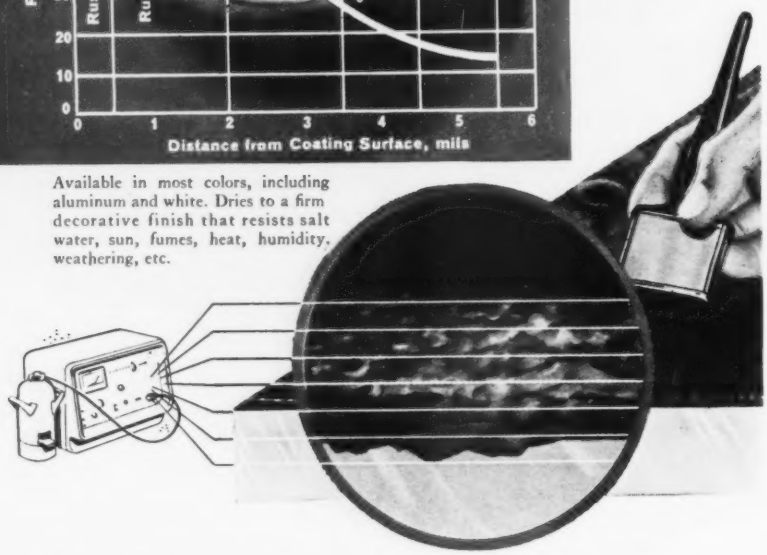

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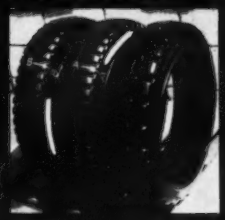

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KING PUBLICATION

March 1956

Vol. XXI, No. 3

ARTICLES

Train-'em-yourself takes over 37
Western plant operators join the region's labor leaders to start producing tomorrow's foreman from today's apprentice.

20-pump fire control system 40
. . . protects a remote plant sprawling over 5,000 desert acres.

Plastic pipe beats corrosion 42
But using it was no "cream-and-honey" situation for this New Mexico uranium mill. Here's what was learned while making it work.

Plant rigged to tumble 44
. . . providing concussion relief in case highly volatile materials ignite. Just one of five safety features at a No. Calif. chemical plant.

Five days from "ruin" to full operation at Ford 46
How Ford's Long Beach, Calif., plant recovered from $3,000,000 flood and fire damages to get back into production fast.

Gas jet turbine for plant power 48
First industrial user of a jet-turbine, Gates Rubber in Denver, will even use steam exhaust of this modern electric power plant.

From bike to mike 51
Radio-dispatched lift trucks do the job 75% faster at Rohr Aircraft.

Tiny bearings need loving care 52
Up-to-date maintenance know-how on miniature precision bearings.

Maintenance without turmoil 56
Examples of smoothly managed upkeep from a Western heating plant.

Key to compressor care—records 60
Check sheets for overhaul double as permanent office records.

50 electric motor manuals 65
Reviews of latest manufacturer technical manuals you can obtain free.

DEPARTMENTS

Views and Comment 10
Letters 12
Western Meeting Reports 20
Labor Notes for the West 30
Helpful Literature 72
New Equipment 80
Trade Winds 93
Westerners at Work 99
Classified Advertising 100
The West On Its Way 101
Advertisers In This Issue 108

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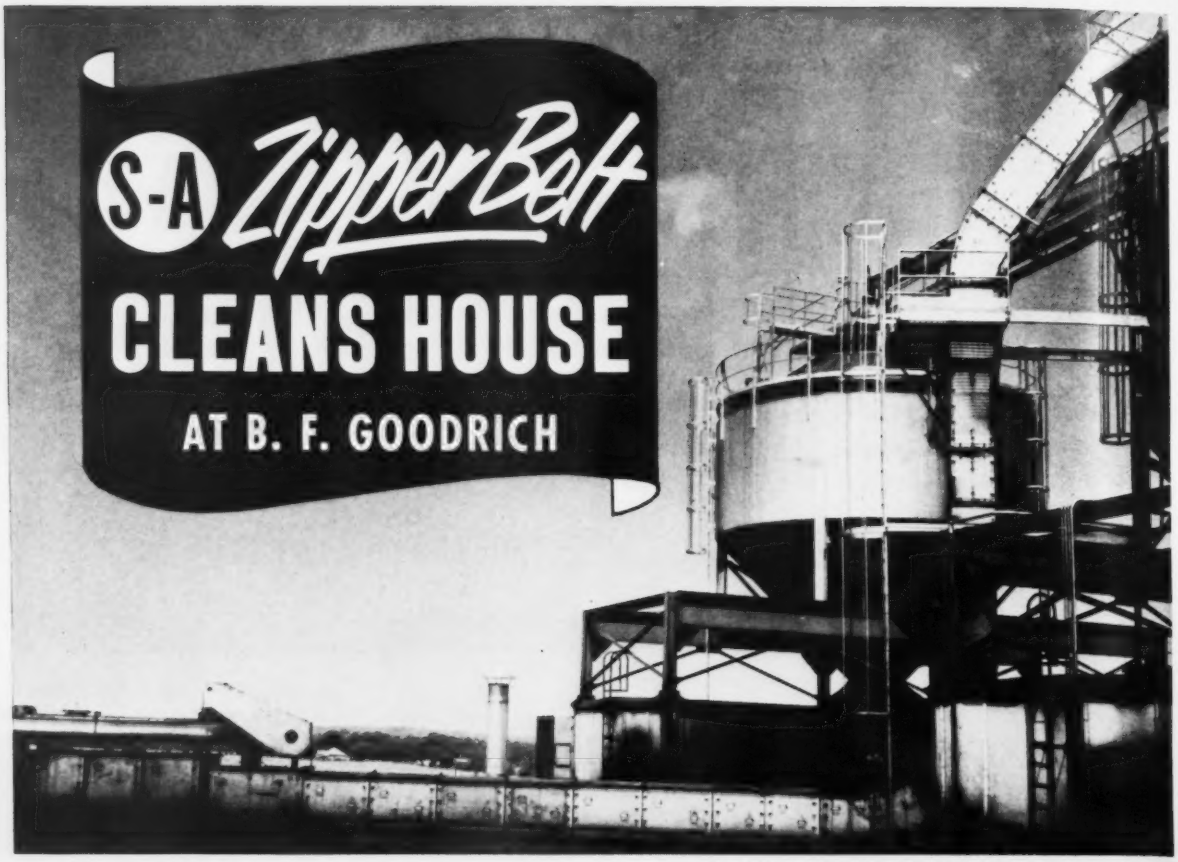


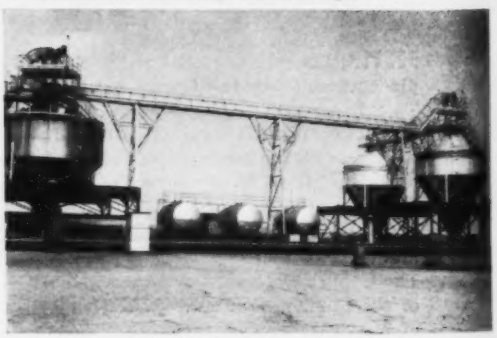
Degradation and dust are eliminated by handling carbon black with STEPHENS-ADAMSON Zipper-sealing belt conveyors.

To preserve the important but fragile structure of carbon black beads and at the same time eliminate dirt accumulation, B. F. Goodrich selected STEPHENS-ADAMSON "zip-in" conveyors for their Tuscaloosa, Alabama plant.

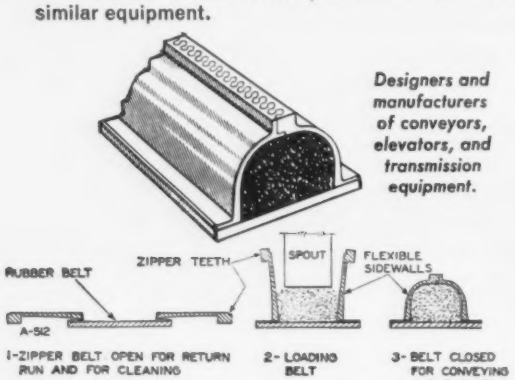
Completely enclosed and gently moved along at 9 tons per hour, carbon black travels horizontally, vertically and on inclined planes from feed to discharge. A very significant reduction in power consumption has been noted where screw type conveyors have been replaced with the S-A Zipper belt.

This installation is a direct result of the success which has been attained in Goodrich plants all over the country with similar equipment.

Enclosed in housing, this zipper conveyor runs 40 ft. horizontally and then 80 ft. on a vertical and inclined plane. Discharge is to either another horizontal zipper (see below) or to storage shown at right.



From elevator and storage section at left zipper conveyor runs 156 ft. horizontally, rises on an incline and discharges to additional storage facilities. Conveyor capacity—9½ tons per hour.



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Designers and manufacturers of all types of bulk materials conveying systems.	A complete line of conveyor accessories—centrifugal loaders—car pullers—bin level controls, etc.	A full line of industrial ball bearing units available in both standard and special housings.

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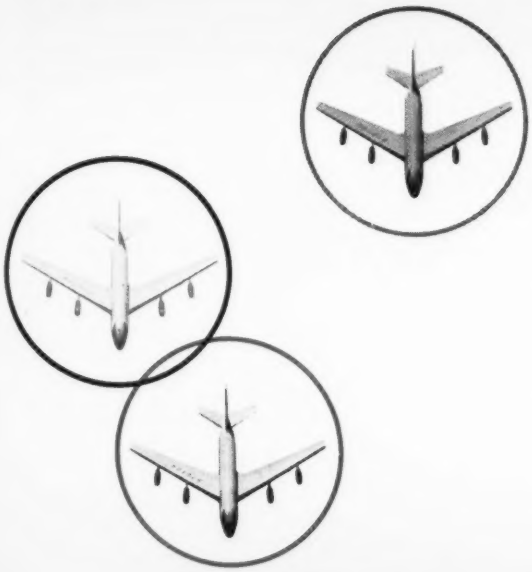

A tribute to American engineering skill, the world's largest privately owned wind tunnel at Boeing's Seattle plant has played a major role in the development of such famed aircraft as the B-47 Stratojet, the B-52 Stratofortress and the 707 Jet Stratoliner.

The tunnel represents an investment to Boeing of well over $2,000,000. Its drive machinery is protected throughout by General Petroleum lubricants developed in Flying Red Horse laboratories.

Your plant, too, can have the added protection demanded by the West's leading industrial firms. Call your nearest G.P. office today for the tops in products and service.

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2-1044

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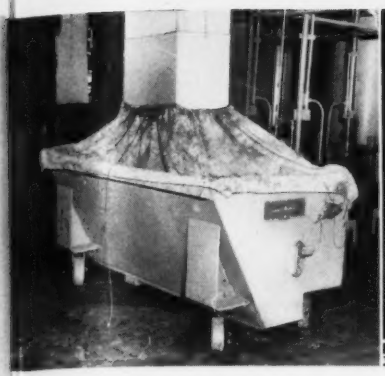
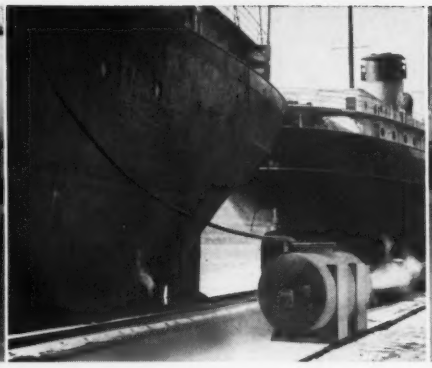
Here's *MASS-HANDLING* of bulk m

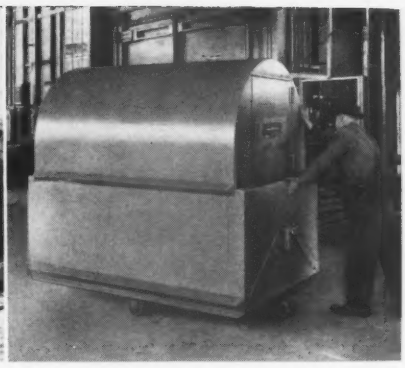
What you see above is a Dempster-Dumpster serving one of its detachable containers. Multiply this simple pick up, haul and dump operation by scores of steel containers built to meet your requirements for handling waste or salvable materials, raw and finished products, fluids including acids, combustibles, dusty materials, etc. You have, then, mass-handling of bulk materials with one truck and one man!



Tilt Type Container is handling filter dirt at a plant in Illinois. Note container is equipped with casters and placed under chute, through which the filter dirt passes directly from presses. As each container is filled, it is replaced with an empty one.



Tank Type Container is being filled with used oil from a ship. Time required to haul loaded container to reclaim station, drain and return for refilling—10 minutes. Time cycle of the former method using conventional barrels—60 minutes.

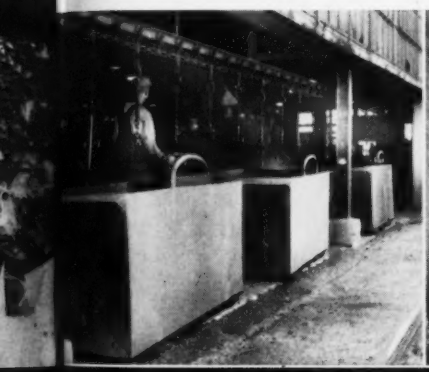


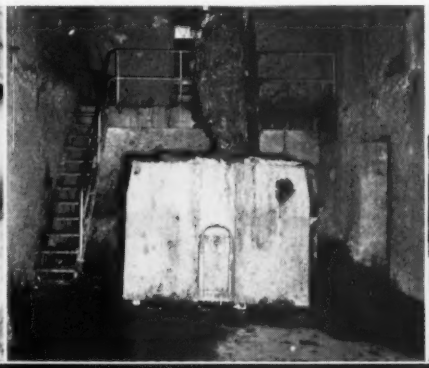
A loaded Apartment Type Container, equipped with roller bearing casters, is being rolled to outside of this plant building. Dempster-Dumpster will pick it up, haul to disposal area, dump the refuse and return empty container for refilling.

Three heavy duty Drop Bottom Type Containers, shown below, are loaded with cast iron fittings from conveyor at plant in Birmingham. Dempster-Dumpster picks up each container when loaded and hauls the finished products to shipping department.

Here's another example of the many types of waste materials handled by this system. The Skip Type Container shown below is located under hydropulper at a paper plant. Picture was shot while container was being filled with rope waste sludge.

Waste materials are loaded into these Universal Containers at a food plant warehouse. Containers have lids in top, as well as a door in each end, which are opened to make deposits, then closed, sealing materials in container.





lk materials with one truck...one man!

A FEW OF THE HUNDREDS of containers available are shown above in actual service. They are built in capacities up to 21 cu. yds.—several times the capacity of the average dump truck body. One Dempster-Dumpster, operated by only one man, the driver, serves scores of big detachable containers, one after another—handling materials of every description. It's like having one truck with scores of bodies!

Records of performance in dozens of installations prove beyond question that savings are tremendous! The Dempster-Dumpster System cuts costs of equipment and operation. It is common knowledge that one Dempster-Dumpster will perform the work of several conventional trucks, reducing investment accordingly. This system eliminates standing idle time and re-handling of materials. Once placed in these containers, materials remain there until hauled to destination. Efficiency, sanitation and good plantkeeping are big advantages. Materials to be transferred or disposed of are constantly being placed in the containers as they accumulate. Containers for handling refuse are fire-proof, rat-proof and scavenger proof.

With no obligation on your part, our engineers will be glad to make a comprehensive fact-finding survey to determine the cost-cutting possibilities of this equipment in your plant. Write us for complete information today! Manufactured exclusively by Dempster Brothers, Inc.

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HOW HIGH IS YOUR "A. Q." TODAY? Is it 5%? 20%? Maybe even 90%?

A. Q. is "Automation Quotient," an entirely new yardstick which now makes it possible for you to rate the progress of automation in your plant and thereby compare your advancements with those being made at any other plant, in any industry. It is defined simply as *the numerical quotient obtained by dividing the average mental age of all supervisory production and engineering men in any given plant, times 100, by the average chronological age of all of the plant's functioning production equipment.*

And we are proud to say that A. Q. is a new term devised and introduced herewith by the editors of WESTERN INDUSTRY, dedicated to helping all industry understand, classify, and utilize effectively the most ballyhooed and boondoggled word of this decade—automation.

Five months ago on this page, we thought out loud that it was about time constructive efforts were exerted toward "pulling this bandied word down from the semantic troposphere." Later, we applauded when James R. Bright, Harvard industrial management lecturer, presented a paper before the ASME in which he defined 17 distinct levels of mechanization, with levels 9 through 17 perhaps definable as "automation." Most important point in his discussion was that automatic control or automatic production methods in many practical manufacturing situations become ridiculous mechanical luxuries. Often they can lead to downright reductions in economic efficiency through high engineering costs, high maintenance costs, and limited operational flexibility.

In Bright's opinion, "automation" is not an absolute, but a relative. It can be used therefore to describe something on a significantly higher level of mechanization than previously existed in one specific manufacturing activity only, but certainly not to compare automaticity advancements in many differing manufacturing activities.

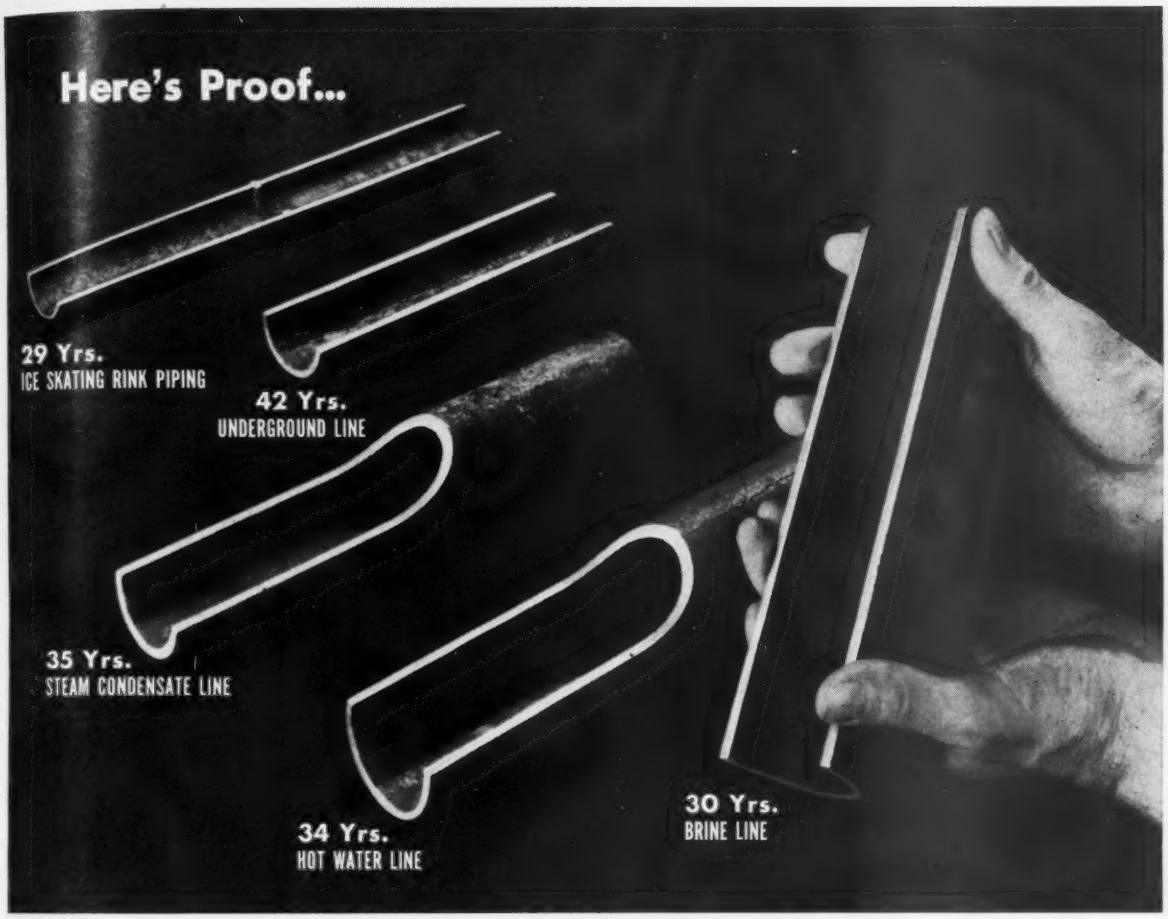
It should be recognized that one man's "automation" is probably already another man's daily practice. For example, what is called a significant automation advancement in a bakery may already be everyday mechanization in an automobile plant. Each should realize that there is nothing economically virtuous per se in the higher levels of mechanization.

We were reminded of these thoughts a few days ago when we received advance results of a national survey on automation. The survey was aimed at determining the extent to which all types of metalworking industries are now applying automation, and their intentions to initiate further automation during the next year or two. Hundreds of plants were asked to state their "percentage of automation." As an example of the results, the study showed that "industry in the West is highly optimistic as regards automatable future . . . for which it gives a figure of close to 25%." And that "in materials handling and inspection operations . . . between 15% and 20% of all operations in the West are estimated as automatable."

Many other results of the survey are stated according to "percentage of automation," and we would be glad to report them in full if we thought they contained any significant meanings for you. However, the "percentage of automation" in any broad grouping of industry has little meaning for the individual manufacturer, who will continue to be most of all interested in new machines that will help him achieve and continue to achieve his optimum economic level of "automation."

The broad-scale survey which came up with so many percentage-stated findings on automation trends was made by The American Society of Tool Engineers. Goal evidently was to devise an impressive means for obtaining advance press space to publicize the big ASTE 1956 Industrial Exposition, opening in Chicago on March 19. Unfortunately, the net result is another contribution to loose application of the word "automation" and to the possibility of added distortions of the technical truths that necessarily must reside under this label. The broad publicity that results of this survey will gain in the public press and in unthoughtful portions of the technical press will have negative value as another preventative to a calmer, saner appreciation of the orderly evolution of mechanization.

The Chicago tool show, if you can make it, will be mightily worth your while—but not in making it possible for you to determine the percentage of automation in your plant, or in determining the "A. Q." of your plant either. We suggest you visit its exhibits to search out those machines and controls that will help you attain the most economic level of mechanization for your entirely individualistic operations. That is where its real values lie, worth publicizing.



WROUGHT IRON PIPE Saves because it Serves longer

True, there's no set rule for predicting how long a pipe material will last in any corrosive service. But there are a lot of mighty dependable clues. The most practical and dependable of all is *service under actual field conditions.*

How does wrought iron pipe measure up when this service-life yardstick is applied?

The answer is documented in the pipe sections shown above. Here you see *actual* samples taken from wrought iron pipe installations in a variety of services. Some of these sections came from buildings that were being torn down. Some were actually cut from in-use installations by our laboratory staff. These sections are interesting not only from the viewpoint of service life, but also pipe condition.

You'll find the reason for wrought iron pipe's ability to last longer in the material's structure and composition. Tiny fibers of glass-like iron silicate are threaded throughout the body of high-purity iron. These fibers are immune to corrosive attack. When corrosion strikes, these fibers halt and detour the attack, prevent rapid pitting and penetration. When you consider that there are more than 250,000 of these fibers to each cross-sectional square inch of wrought iron, it's easy to understand why this material is more than a match for corrosion.

Our bulletin, *Piping for Permanence*, tells more of this story, and covers a variety of services where wrought iron pipe saves because it serves longer. Write for your copy.

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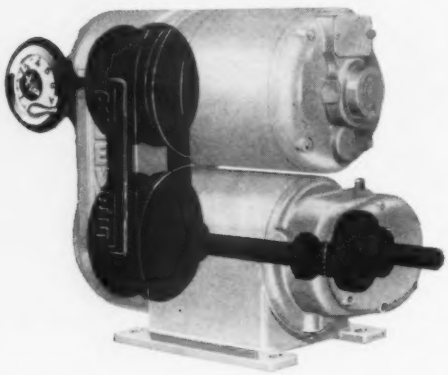
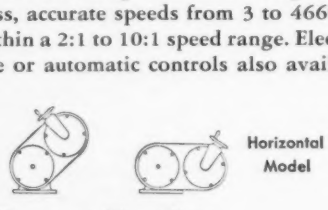
Within streamlined, metallic blue housing is REEVES' "weatherized" motor, time-tested speed changing mechanism, and heat-treated helical gear speed reducer. Maximum space for vertical model only 16 5/16" x 21½" x 11½". Other models equally compact.



simple, accurate operation

14-turn handwheel on Speedial indicator gives you stepless, accurate speeds from 3 to 4660 rpm's—within a 2:1 to 10:1 speed range. Electric remote or automatic controls also available.



versatile application

Select your *exact* needs from 112 assemblies: ¼, ½ or ¾ hp. units; horizontal left or right, vertical, or 45° left or right models; horizontal or vertical down output shaft.

Write Dept. 19a-M543 for complete bulletin.

REEVES PULLEY COMPANY ASSEMBLY PLANT
901 Minnesota Street • San Francisco 7, California
Division of **RELIANCE** *Electric and Engineering Co.*

. . . for more details, circle No. 8 on Reader Service Postcard

LETTERS

Can you help this reader with a handling problem?

EDITOR—We are interested in obtaining a solution to the following problem.

As wholesale distributors of lumber and allied products, we maintain four forklift trucks of various capacities. Customary usage of this equipment is to handle "loads of lumber" by inserting the forks "from the side of the load." This means that in our storage bay we may have six or more loads to remove in order to make the load wanted accessible. In other words, we are piling lumber loads about three high and about three of these tiers deep so that to uncover and remove any of the loads in the rear tier we must take all of the loads in front of it out of the bay.

We have been trying to devise an attachment for our forklifts that would permit "handling by the end of the load," in which case we would change the direction of our loads by 90 deg., and therefore instead of three tiers deep we would have three tiers wide in each bay and only have to remove two loads at most to get any one of the nine loads thus stored in each bay. In other words, we would only have to remove the two top loads to get at the bottom load.

We have seen a clamp arrangement devised by a midwestern firm similar to one pictured in your December issue. However, we would not need the "reaching apparatus" but merely the clamping attachment.

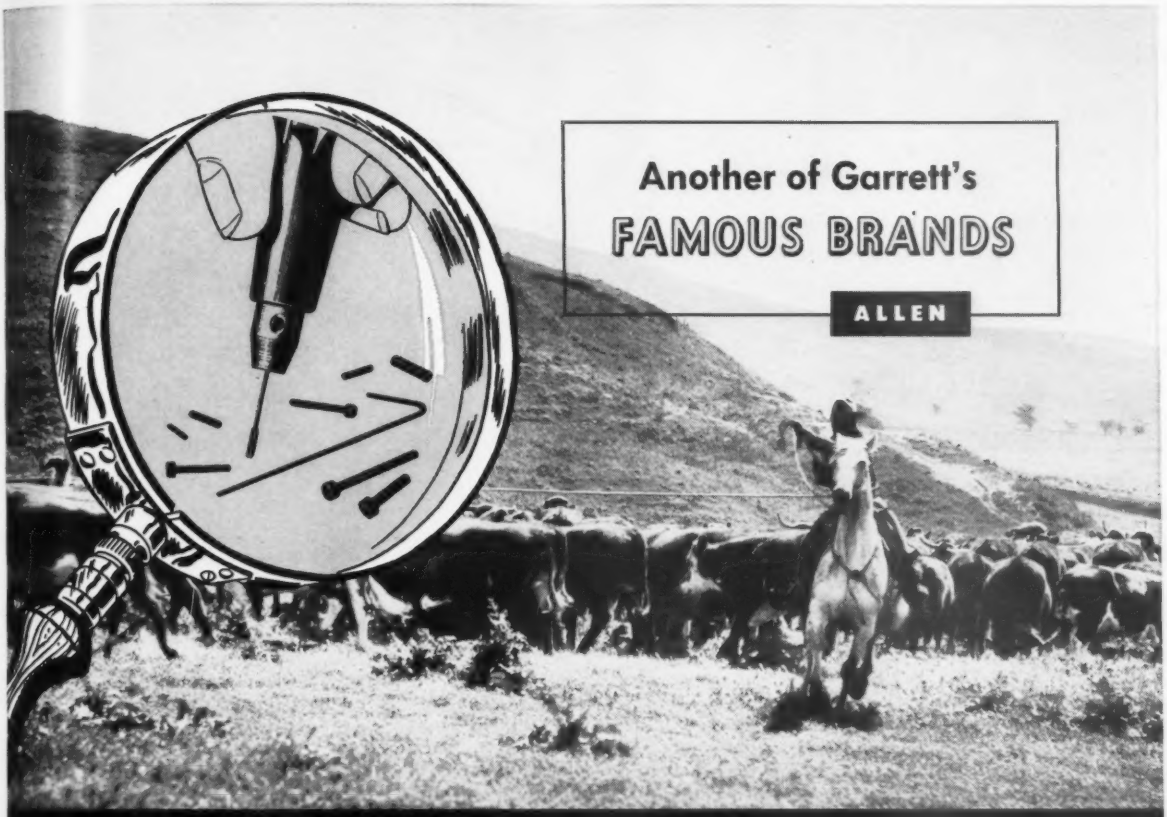
Our loads are mainly hardwood lumber, weighing up to 2 or 3 tons each, and are about 5 ft. wide by various heights. Width of the loads could be revised. Since these loads normally rest on wooden bolsters of about 4 in. x 4 in. x 5 ft., it would be difficult for them to be "withdrawn" except by lifting.

We will appreciate receiving any suggestions.

LEROY STANTON, JR.
E. J. Stanton & Son
Los Angeles, Calif.

(Here's a chance for readers to lend a helping hand. Send along your ideas to Editor, WESTERN INDUSTRY, *609 Mission St., San Francisco 5, and we'll be glad to forward them to Mr. Stanton.—Ed.)*

. . . continued on page 16



NOW MIDGET-SIZE ALLEN SCREWS THAT DO MAN-SIZE JOBS COME IN STANDARD SIZES!

No longer is it necessary to order special screws for miniature-size requirements. Allen now offers the finest hex-socket, cap and set screws in diameters from #0 through #3 as standard. These are the smallest socket screws in the world, and in stock at Garrett.

The Garrett Supply Company carries the largest and most complete line of Allen Screws in the west. Allen is one of more than 100 famous brands with which we service our customers... and "service" at Garrett means help and advice on any and all your tooling problems. So, whatever you need, "Get it from Garrett!"

HEADQUARTERS IN SOUTHERN CALIFORNIA AND ARIZONA FOR THESE AND OTHER FAMOUS BRANDS

Boston Gears
Putnam End Mills
Chain Belt
Carboloy Tools
General Electric Motors
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GARRETT SUPPLY COMPANY

3844 South Santa Fe Ave., Los Angeles 58, California
130 West Madison St., Phoenix, Arizona

a division of **THE GARRETT CORPORATION**

... for more details, circle No. 9 on Reader Service Postcard

Check your AIM*. . . Anaconda did . . .

Bulky products unitized for faster handling

ACME STEEL STRAPPING helped eliminate slow, costly manual handling of zinc slabs at The Anaconda Company, Anaconda, Montana. Each day over 700,000 pounds of zinc are unitized by stacking and strapping and then loaded in freight cars by lift truck. And it's done in ⅓ the time of former hand loading. (Idea No. U6-3)

Anaconda's customers are also sold on unitizing. Unloading is fast. Inventory is simplified. Storage space is used more efficiently.

ANACONDA®

Acme Idea Man Don Hughes services and supplies ideas to The Anaconda Company

***Check YOUR Acme Idea Man today.** He will show you examples of many similar Ideas-In-Action. He can use his experience to adapt these ideas to your needs. Write to Dept. HJ-36, Acme Steel Products Division, Acme Steel Company, 2840 Archer Avenue, Chicago 8, Ill.

ACME STEEL STRAPPING

ACME STEEL

. . . for more details, circle No. 10 on Reader Service Postcard

its Advantages are turned to greatest account by Louden

Overhead handling possesses fundamental and inherent advantages over any other system. And Louden's pioneering experience, broader range of equipment and engineering knowledge turn these advantages to greatest account in planning a handling system for you. The American Stamping Company, Cleveland, Ohio, installation shown here is a typical example. The customer's needs were limited. He wanted a much better die storage system in his new building than he had in his old. Louden had the engineering knowledge *but it also had the equipment the customer needed* . . . a stacker crane. Because this was so, storage facilities could be restricted to a small area with narrow aisles between racks. Yet the stacker crane, suspended from the rails above, moves freely and maneuvers freely in these aisles. It is operated by any one of the stamping machine attendants.

Louden is unique in the engineering vision and experience it brings to your problem . . . and in the wide range of equipment it has to draw upon. Louden overhead handling saves labor and cuts handling costs sharply. Louden handling travels more swiftly, speeds operations, often leads to increased production. Louden permits maximum utilization of floor space and air space too. It repays its cost within a year . . . within months . . . has done so within weeks. The least you should do is see what the best in engineering recommends. Then will be time for you to decide.

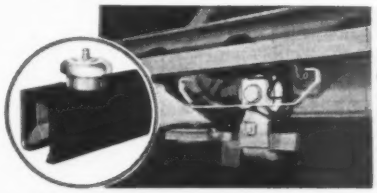
No more crowded, cramped stacking of dies along walls and needlessly wide aisles for trucking. In new American Stamping Co. building, Louden's engineering and equipment confine storage to 40 x 40 feet. Stacker crane moves on runways *above*, negotiates narrow aisles between racks easily, handles dies in and out of racks with delicacy, precision and speed.

Louden

MONORAIL & CRANES

THE LOUDEN MACHINERY COMPANY • 6103 Superior, Fairfield, Iowa

A Subsidiary of Mechanical Handling Systems, Inc.



New! Louden Shokpruf Electrification . . . for all monorail and crane installations. Hazards of open conductor bars now completely overcome by this exclusive Louden engineering development. Write for full details of this safe conductor system.

SINCE 1867 . . . THE FIRST NAME IN MATERIALS HANDLING

. . . for more details, circle No. 11 on Reader Service Postcard

LETTERS

. . . continued from page 12

Your remarks guide WI editors

At the end of the "reader verification form" that each recipient of WESTERN INDUSTRY *returns to us periodically is a space provided for remarks. We are always pleased that so many readers take the time to express in that space their opinion about* WESTERN INDUSTRY *and its service to them, even when brickbats mar our bouquets! We've reproduced a few recent remarks below to give you an idea of what readers are saying about* WI *these days. When your next* WI *verification form comes along, how about telling us what you think about* WESTERN INDUSTRY, *and suggesting subjects you'd like to have covered? We don't dodge brickbats either, so if we deserve 'em, throw 'em!*—Ed.

Some mention subjects they want WI to cover . . .

"Material covering problems of human relations and labor will be helpful to us."—JOSEPH B. MCKEAN, Supervisor of Mining Engineering, Columbia-Geneva Steel, Dragerton, Utah.

"We are particularly interested in information on industrial engineering techniques, and on methods of improving equipment."—W. C. HANSEN, Time Study Engineer, Moore Business Forms, Pleasant Hill, Calif.

Some tell us how WI is used in their plants . . .

"WESTERN INDUSTRY first goes to our President, then to Purchasing Agent, on to our Plant Superintendent, and thence to Traffic Manager."—Secretary, Becker Products Co., Ogden, Utah.

"We have our machine shop read WESTERN INDUSTRY. Then it goes to our carpenter shop, boiler room, and chemical department."—J. M. WEAVER, Superintendent, Pacific Match Co., Tacoma, Wash.

"Copies of WESTERN INDUSTRY are circulated to men in the plant, and also serve a library reference function." Librarian, Plant Technical Library, General Electric Co., Richland, Wash.

Others simply tell us we're on the right track . . .

"WESTERN INDUSTRY is the only publication that I receive that is interesting enough to read completely through." FRANCIS STACK, Assistant Department Head, Univ. of Calif. Shop Dept., Los Alamos, New Mexico.

•

A problem in re-reading

EDITOR—Very often we find a subject in your magazine which we wish to extract for future re-reading or to pass on to one of our department heads. Why not allow a wider left hand border, say 1¼ in.? With this extra border a page can be extracted and filed in a reference folder for future study.

GEORGE A. WARNER
Manager, Fluorspar Branch, Shattuck Denn Mining Corp., Albuquerque, New Mexico

(Wish we could, Mr. Warner, but the economics of publishing dictate a standard size paper sheet for a 7 x 10-in. format publication which, when folded and trimmed, does not allow added border space. We suggest a label and note form designed to be stapled at the border of pages removed, or perhaps the use of an 8½x11 sheet of paper attached to the extracted article as a "cover."—Ed.)

Columbia SAFEGUARD makes our floors safer and better looking, and it actually costs less to use! These advantages make Columbia SAFEGUARD the logical choice for safer, better floor maintenance!

It's 9 Ways Better!

Safer • More Beautiful • Easy to Apply
Use on Any Floor • Removable by Normal Methods
Easier to Maintain • Wears Longer
Looks Better Longer • Competitively Priced

The Test is on YOUR FLOORS!

The best way to prove new Columbia SAFEGUARD is safer and better is to try it on your floors. Your Columbia representative will be glad to make a demonstration. No obligation!

SAFEGUARD YOUR FLOORS • SAFEGUARD THE PUBLIC
SAFEGUARD YOURSELF AGAINST LIABILITY

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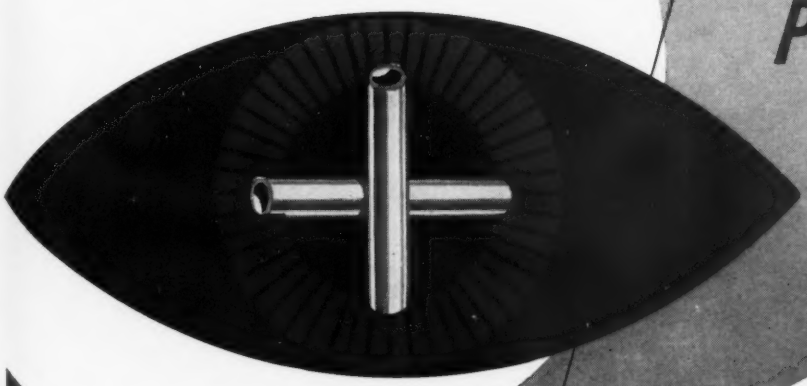
General Offices—530 Riverdale Drive, Glendale 4, California
Oakland Office—600 Sixteenth Street, Oakland 12, California

. . . for more details, circle No. 12 on Reader Service Postcard

You can see the PLUS VALUES in Ostuco Performance!



1 ***You'll see SPECIAL QUALITY Tubing*** that lets you turn hidden costs into extra profits. Ostuco's lightweight strength values, more uniform tube walls and fine finish result in seamless and electric resistance welded steel tubing of unmatched quality.

2 ***You'll see DESIGN-ENGINEERING SERVICE*** go to work on your tubing problems. A wealth of design and production information is at your service. Ostuco's experience dates from the beginning of the seamless tube industry.

3 ***You'll see ON-TIME DELIVERY*** of tubing as promised! No costly delays that hold up your production. Ostuco has the reputation of making deliveries on schedule.

4 ***You'll see "SINGLE-SOURCE" SERVICE*** in action and you benefit through convenient, error-free handling of the entire order! Manufacturing and fabrication is under one roof at Ostuco—one order eliminates multiple shipments, saves time and handling costs.

Some good things our customers are saying about OSTUCO:

Agricultural Equipment: *"Your Mill is doing an excellent job with regard to maintaining delivery promises."*

Hydraulic Equipment: *"We feel partial to you because of the excellent service."*

Machine Tools: *"You are receiving 100% of the tubing we purchase and will continue to do so as long as you keep up the good quality and service."*

Drilling Equipment: *"Your tubing is the best we've ever had because of its exceptional straightness and good workmanship."*

Blue chip companies, the world over, look to Ostuco for practical solutions to their steel tubing problems. Why don't you ask one of our Tubing Engineers to show you how OSTUCO'S PERFORMANCE PLUS service turns drawing-board ideas into top quality parts faster . . . more dependably . . . with greater savings.

OSTUCO SHELBY, OHIO

OSTUCO TUBING

SEAMLESS AND ELECTRIC RESISTANCE WELDED STEEL TUBING—Fabricating and Forging

OHIO SEAMLESS TUBE DIVISION
of Copperweld Steel Company • ***SHELBY, OHIO***
Birthplace of the Seamless Steel Tube Industry in America

SALES OFFICES: *BIRMINGHAM • CHARLOTTE • CHICAGO (Oak Park) CLEVELAND • DAYTON • DENVER • DETROIT (Ferndale) HOUSTON • LOS ANGELES (Beverly Hills) • MOLINE NEW YORK • NORTH KANSAS CITY • PHILADELPHIA PITTSBURGH • RICHMOND • ROCHESTER • ST. LOUIS ST. PAUL • SALT LAKE CITY • SEATTLE • TULSA • WICHITA*

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EXPORT: *COPPERWELD STEEL INTERNATIONAL COMPANY 117 Liberty Street, New York 6, New York*

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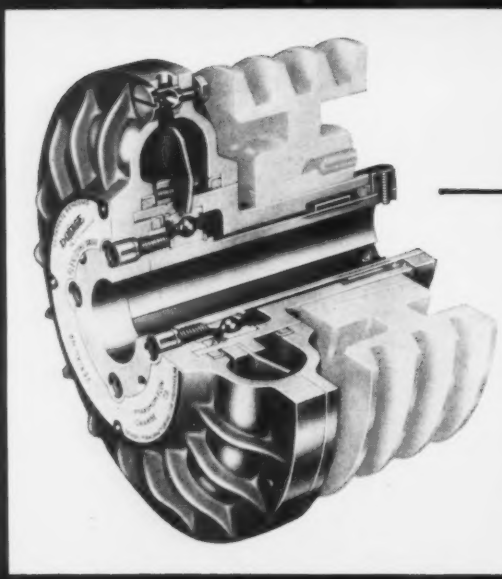


Great Performance!

– is the verdict from the field on

FLEXIDYNE

THE DRY FLUID DRIVE

Experience in the field proves that the new principle employed in Flexidyne provides a better way to handle difficult drive problems. Now delivered from stock, Flexidyne Drives and Couplings are used in a wide variety of applications. Already reports like these are coming in about Flexidyne performances in many tough assignments:

RAILROAD CAR PULLERS . . . *"Starts fine . . summer or winter!"*
CONVEYORS . . . *"We start under full load now!"*
COTTON CARDS . . . *"Finally . . the soft start!"*
TRAVELING CRANES . . . *"Spots our load . . and how!"*
PUMPS . . . *"Now we are using smaller motors, too!"*
VENTILATING FANS . . . *"Takes off smooth as silk!"*
. . . AND OTHER HEAVY INERTIA LOADS . . . *"Wonderful performance!"*

Call the Transmissioneer, your local Dodge Distributor, for details about Flexidyne. Factory-trained by Dodge, he can give you valuable assistance on new, cost-saving methods. Look for his name under "Power Transmission Machinery" in your classified telephone directory, or write to

DODGE MANUFACTURING CORPORATION, 6600 Union Street, Mishawaka, Indiana

DODGE
of Mishawaka, Ind.

. . . for more details, circle No. 14 on Reader Service Postcard

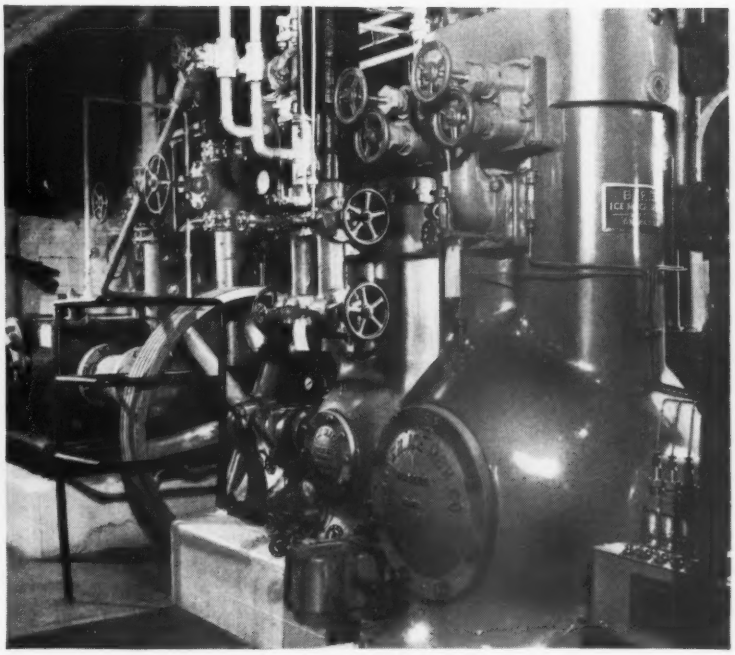
Standard Engineer's Field Report

CASE HISTORY

LUBRICANT Calol Multi-Machine Oil ICH

FIRM Minute Maid Corporation Kent, Wash.

Compressor runs 10,000 hours without repairs or valve trouble of any kind!



THIS 10½x10½ BAKER (right) and five similar compressors refrigerate 2 deep-freeze rooms as well as 11 quick-freezers at Minute Maid Corporation's Kent, Washington, plant (see broccoli packaging line, above left). Down-time can mean a costly loss of stored food and lost production. By switching to Calol Multi-Machine Oil ICH, the company ended all previous trouble with sticking valves and carbon build-up, reduced wear to a negligible rate. One 8x8 compressor was inspected recently after running more than 12 hours a day for two years—10,000 hours—without trouble of any kind—only parts replaced were two wrist pins and bushings!

CALOL

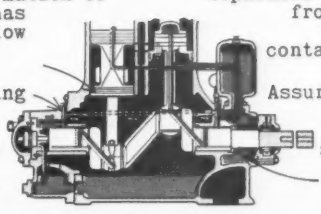
TRADEMARK "CALOL" REG. U. S. PAT. OFF.

FOR EXPERT HELP on lubrication or fuel problems, call your Standard Fuel and Lubricant Engineer or Representative, or write to 225 Bush Street, San Francisco, Calif.

Why Calol Multi-Machine Oil ICH reduces maintenance on bearings, pumps, compressors

Resists formation of deposits; has extremely low pour point

Separates rapidly from water and contaminants



Metal-wetting ability keeps oil on bearings under heaviest loads

Assures efficient seal of stuffing box glands

STANDARD OIL COMPANY OF CALIFORNIA

. . . for more details, circle No. 15 on Reader Service Postcard

EARLY PLANNING FOR 1957 WESTERN METALS EXPOSITION AND CONGRESS took place when William H. Eisenman, national secretary of the American Society of Metals, traveled recently from Cleveland to Los Angeles to confer with L. A. chapter officials. March 25-29, 1957, was set as the date for the metals show. Pan-Pacific Auditorium and attached special pavilions in Los Angeles will be show headquarters, with technical sessions of this tenth session meeting at the Ambassador Hotel.

Western plant executives and engineers attending the 1955 event totaled 53,630; prediction is that the 1957 show will be even larger. Designed to serve the West's greatly expanded metals industries, technical sessions of three metals show will involve discussions on selection, fabrication, application, and testing of metals. Cooperating with ASM in the show are about 20 other technical societies, some of which plan technical sessions of their own as metal show program features.

•

SEATTLE CHAPTER IS SIPMHE'S nineteenth active unit and third on the West Coast. Pro tem officers to get the ball rolling in the Northwest for the Society of Industrial

SIPMHE MANAGING DIRECTOR C. J. Carney, Jr., congratulates Palmer Arzo of Industrial Crating & Packaging, Inc., upon his election as president pro tem. Others are, left to right: John D. Roberts, Waterway Terminals Co., Portland, Ore.; Edward Look, Portco Corp., Vancouver, Wash.; W. T. Segerstrom, Packaging Commodities, Seattle, Wash.; John Mierz, Boeing Aviation Corp., Seattle; and William Moratti, United Control Corp., Seattle.

Packaging & Materials Handling Engineers are Palmer Arzo of Industrial Crating & Packing as chapter president and W. T. Segerstrom of Packaging Commodities as secretary-treasurer. Installation ceremonies were attended by 53 persons with C. J. Carney, Jr., managing director of the society, out from Chicago to do the honors.

LATEST IN ELECTRICAL EQUIPMENT will be displayed at more than 100 booths in Los Angeles early next month at the eighth biennial Electrical Industry Show. Date: April 5-7. Place: Shrine Exposition Hall. Sponsor: Electrical Maintenance Engineers Assoc. of Southern California. A special feature of the show this year will be educational exhibits by universities, government agencies, and various branches of the Armed Forces. If you like to get your education via motion pictures, there'll be plenty of those too. See the meeting notice below for the man to contact if you want more information.

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LATEST IN OFFICE EQUIPMENT FOR YOUR PLANT will be shown at the Ambassador Hotel in Los Angeles April 24-27. It's the ninth annual Southern California Business Show sponsored by the Los Angeles chapter of the National

SOUTHERN CALIFORNIA Business Show queen, Doris Ruddick, with Jack W. B. Stanley, head of the Business Show advisory committee.

Association of Cost Accountants. Over $5,000,000 worth of equipment, ranging from letter folders to automatic calculating equipment, will be exhibited to an expected attendance of about 9,000. Heading the advisory committee of the show is Jack W. B. Stanley, president of the L. A. chapter of NACA and district manager of the American Appraisal Co.

•

EVERY NIGHT IS LADIES NIGHT, that is on meeting nights at the Executives & Technical Women of Industry's organization in Los Angeles, but a recent meeting belonged to four ladies in particular. Elected and installed as 1956 officers of the activity were President Jessie Matranga, Birtcher Corp.; vice president, Mary FitzSimmons, Precise Instrument Parts Co.; secretary, Elsie Strickland, Standard Coil Products Co.; and treasurer, Natalie Bistagne, Paasche Airbrush Co.

•

MEETINGS YOU SHOULD PLAN TO ATTEND

Mar. 16-17—SECOND ARIZONA STATEWIDE INDUSTRIAL DEVELOPMENT WORKSHOP, sponsored by University of Arizona in cooperation with Arizona Chamber of Commerce Managers' Assoc., Arizona Development Board, and Arizona Municipal League, to be held on University of Arizona campus, **Tucson.** Contact Lauren W. Casaday, chairman, program committee, Bureau of Business Research, Univ. of Ariz.

Mar. 18-21—AMERICAN SOCIETY OF MECHANICAL ENGINEERS, spring meeting, Multnomah Hotel, **Portland, Ore.** Contact ASME headquarters, 29 W. 39th St., New York 18.

. . . continued on page 22

forging problem

Solve it with AMFORGE 3-V's

Variety: The equipment to forge many different sizes and shapes.

**Actual photographic reproductions of forged parts recently produced by the AmForge, Azusa, plant.*

Versatility: The ability and skill developed through years of experience to help you engineer your forgings.

Vision: A willingness to become your *partner* in the solution of your forging problems, present and future.

Serving the Western states with forged parts is our business. Your cost, weight, stress and machining problems are our first concern. Our plant in Azusa, California, is equipped to follow through on the most complicated orders—either *Press* or *Upset* Forgings. Our engineers are prepared to work with you. Please phone us collect when you have a "forging" problem.

Phone—Azusa, EDgewood 4-4931.

AMERICAN Brake Shoe COMPANY

AmForge Division

155 N. WACKER DRIVE, CHICAGO 6, ILLINOIS

PLANTS: AZUSA, CALIFORNIA • CHICAGO, ILLINOIS

... for more details, circle No. 16 on Reader Service Postcard

Built to set the pace and HOLD IT!

Milwaukee

HEAVY-DUTY *Electric* DRILLS

Capacities 1/4" to 7/8" dia.

Ball and Roller Bearings Throughout

For POWER . . . RUGGEDNESS . . . and DEPENDABILITY you just can't beat the performance built into these drills. From chuck tip to trigger switch they bring you ***Stallproof Dependable*** drilling power that lets you keep pace with stepped up production schedules.

No worry about down time or repeated need for tool servicing when you use MILWAUKEE . . . each motor is engineered and built in our own plant to deliver the maximum efficiency and performance in the model it drives.

Dependable Service Too . . . if and when tool repairs or overhauling is needed quickly, service with genuine factory parts is readily available — through more than 33 MILWAUKEE service branches throughout the United States and Canada.

28 MODELS

The complete MILWAUKEE line includes drills in many models, speeds and capacities from 1/4 to 7/8" to suit practically any power drilling need. Write for complete free Catalog G-7.

MILWAUKEE ELECTRIC TOOL CORP.

West Coast Factory Branch and Service Station

2569 W. Olympic Blvd. Los Angeles 6, Calif.

SAWS • SANDERS • GRINDERS • HAMMERS • SCREW DRIVERS • POLISHERS • DRILLS

Main Plant and Office . . . Milwaukee 8, Wisconsin

. . . for more details, circle No. 17 on Reader Service Postcard

WESTERN MEETINGS

. . . continued from page 20

Mar. 22-23—ANNUAL SPRING CONFERENCE OF ENGINEERING AND OPERATING SECTIONS, PACIFIC COAST ELECTRICAL ASSOC., Sheraton-Palace Hotel, **San Francisco.** Contact E. F. Perkins, PCEA, 681 Market St., San Francisco.

Mar. 26-28—INTERMOUNTAIN LOGGING CONFERENCE, Davenport Hotel, **Spokane, Wash.** Contact Charles Keim, Bigfork, Mont.

Mar. 26-28—SOCIETY OF PLASTIC INDUSTRIES, Pacific Coast section, convention, **San Francisco.** Contact K. R. Mergen, Crest Molded Products, 401 Kieways Ave., Arcadia, Calif.

Mar. 27-Apr. 2—SOCIETY OF THE PLASTICS INDUSTRY, 13th annual Pacific Coast Section Conference, St. Francis Hotel, **San Francisco,** and SS. "Lurline" to Honolulu. Contact Society headquarters, 67 W. 44th St., New York 36.

Mar. 30-31—JOINT SPRING MEETING OF WESTERN SECTION OF OPERATIONS RESEARCH SOCIETY OF AMERICA AND LOS ANGELES CHAPTER OF INSTITUTE OF MANAGEMENT SCIENCES, sponsored by University of California Extension and Department of Engineering, **Los Angeles.** Contact offices of U. of C. Extension, Engineering, Los Angeles 24.

Apr. 5-7—8TH BIENNIAL ELECTRICAL INDUSTRY SHOW, sponsored by Electrical Maintenance Engineers Assoc., Shrine Exposition Hall, **Los Angeles.** Contact Show headquarters, 3443 So. Hill St., Los Angeles 7.

Apr. 6-7—1956 WESTERN REGIONAL CONFERENCE AND INDUSTRIAL ENGINEERING EXPOSITION, sponsored by American Institute of Industrial Engineers, Hotel Mark Hopkins, **San Francisco.** Contact WERAC, AIIE. P. O. Box 553, San Leandro, Calif.

Apr. 10-11—NORTHWEST WOOD PRODUCTS CLINIC, Davenport Hotel, **Spokane, Wash.** Contact Everett Ellis, secretary-treasurer, N.W.P.C., P. O. Box 291, Univ. Station, Moscow, Ida.

Apr. 11-13—ILLUMINATING ENGINEERING SOCIETY, Western regional conference, Hotel Mark Hopkins, **San Francisco.** Contact James Barnes, 4th and E Sts., San Rafael, Calif.

Apr. 11-14—AMERICAN INDUSTRIAL DEVELOPMENT COUNCIL, St. Francis Hotel, **San Francisco.** Contact Frank Marsh, vice president, 130 Montgomery St., San Francisco.

Apr. 18-21—COPPER AND BRASS WAREHOUSE ASSOC., INC., annual meeting, San Marcos Hotel, **Chandler, Ariz.** Contact David A. Heller, director, public relations, Assoc. offices, Suite 1025, 15th and K Sts. N. W., Washington 5, D. C.

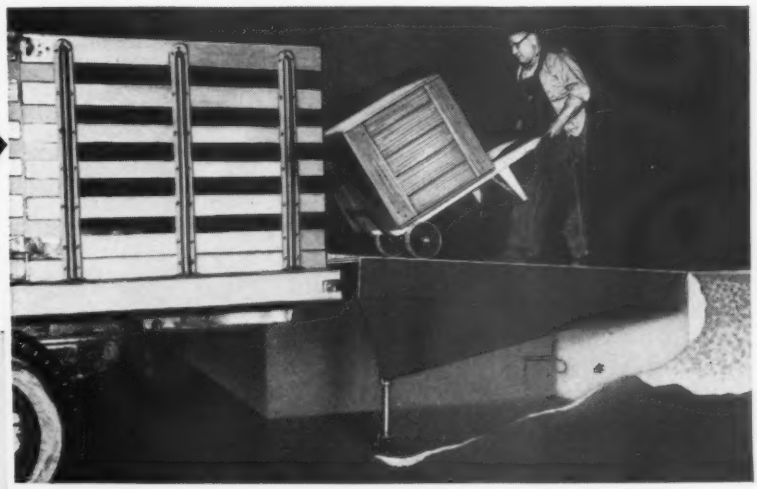
May 3-5—PACIFIC COAST OIL HEAT INSTITUTE, Davenport Hotel, **Spokane, Wash.** Contact Leon Boyle, c/o Spokane Chamber of Commerce, or phone EM-1521.

. . . continued on page 26

NEW! Versatile...Easily Installed!

GLOBE TRANS-O-MATIC RAMPS

To speed loading and cut handling costs, Globe's new Trans-O-Matic Ramps bring dock level to truck bed level with fast push-button control. Platform measures 6' x 8' 4" including 14" all steel lip.



Sturdy hydraulic jack is operated by power "package" consisting of motor, pump, reservoir and valves. Entire mechanism is weather-protected and snugly mounted between supporting box members for extra protection.

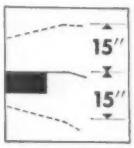
MULTIPLE SAVINGS—INCREASED DOCK CAPACITY

Truck loading and unloading is smooth and safe... costly rehandling of goods is eliminated... when Globe Trans-O-Matic Ramps go into action on your loading dock.

Because goods move swiftly across platform without interruptions, your present dock area can handle two or three times *more* freight. Material handling costs are substantially reduced.

25% GREATER RANGE

Lip of steel ramp moves 15" up or down from horizontal to provide full 30" travel. Ramp "floats" with rising or lowering action of truck or trailer floor. Unique lip design provides smooth roll-over.



NO EXCAVATION OR PIPING

Entire Trans-O-Matic mechanism is *above ground*, permitting quick, low-cost installation. If need be, complete ramp can be easily moved and relocated without loss.

BOX CONSTRUCTION PROVIDES EXTRA RIGIDITY

Two parallel box members, of ¼" steel plate, reinforce ramp and provide added strength without weight. Ramp sustains roll-over weight of 20,000 lbs., and storage loads up to 400 lbs. per sq. ft.

CHECK THESE AUTOMATIC AND SAFETY FEATURES . . .

- ✓ Ramp "floats" automatically with changes in truck bed height.
- ✓ Automatic safety lock holds ramp in fixed position when truck pulls away from dock.
- ✓ At platform level, ramp locks in place to accommodate cross-traffic and storage.
- ✓ Skirts at sides provide full protection as toe guards.
- ✓ Non-slip checkered steel plate assures firm footing.

GLOBE®

TRANS-O-MATIC RAMPS

PLANTS: DES MOINES—PHILADELPHIA—LONG BEACH, CALIF.

Clip today for free copy

GLOBE PACIFIC HOIST COMPANY
1461 Canal Avenue WI-720-TR
Long Beach 13, California

Please send me more information on Globe Trans-O-Matic Ramps together with FREE booklet "Case Studies in Modern Lifting."

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COMPANY_____

ADDRESS_____

CITY_____ STATE_____

... for more details, circle No. 18 on Reader Service Postcard

Change motors in minutes—

with FALK *all-steel* MOTOREDUCERS

No long and costly "down time" involved

Motors can be interchanged or replaced *in minutes* with the all-steel, All-Motor type FALK Motoreducer. No long and costly "down time" is involved in making the change!

Best of all, replacement is not limited to original make of motor—new NEMA frames may be substituted for old. This versatile Motoreducer operates with any make, speed or type of standard foot-mounted motor within its AGMA rating. No modification, no special shaft, no "partial" motor required.

In addition to unmatched motor interchangeability, this dependable gear drive—the "work horse of industry"—offers: widest choice of output-shaft position (horizontal, vertical, right-angle)...any output-shaft connection...any mounting, including wall and ceiling...standard speed range from 1.5 rpm to 1430 rpm. All these advantages, plus proved efficiency, low maintenance and extra-long life, make the All-Motor type FALK Motoreducer your best buy for any job requirement.

Furnished in sizes up to 75 hp with any make, style or type of motor; or, *without a motor if desired.* FALK Motoreducers are available from convenient factory, field or distributor stocks, from coast to coast.

Write for Bulletin 3100

THE FALK CORPORATION, MILWAUKEE, WISCONSIN

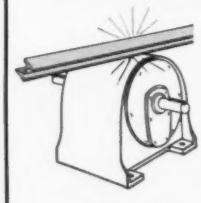
MANUFACTURERS OF:

- Motoreducers
- Speed Reducers
- Flexible Couplings
- Shaft Mounted Drives
- High Speed Drives
- Special Gear Drives
- Single Helical Gears
- Herringbone Gears
- Marine Drives
- Steel Castings
- Weldments
- Contract Machining

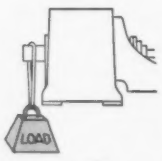
FALK

...a good name in industry

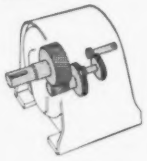
FALK "IN-BUILT" FACTORS assure full dependability—better service—longer life



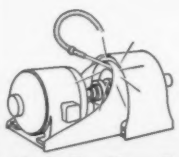
ALL-STEEL HOUSINGS
Rugged, strong, rigid ...all parts heavy steel plate, formed and welded in the Falk Weld Shop.



LARGE OVERHUNG LOAD CAPACITY
Large shafts, oversize bearings...rigid mountings with wide bearing spans to handle maximum loads.

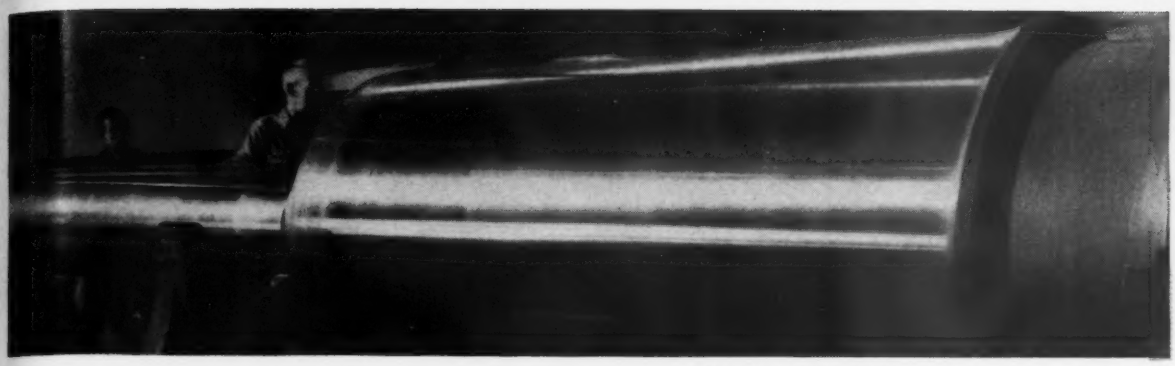


PRECISION GEARING
Heat-treated alloy steel gearing, precision cut and shaved after heat treatment to eliminate distortion.



SEALED HOUSINGS
Splashproof, dustproof, oiltight. Dual closures and one-way vents keep oil in, dust and moisture out.

... for more details, circle No. 19 on Reader Service Postcard



40-ton hydraulic press ram was rebuilt with a ton of special stainless steel and precision-machined to close tolerances.

30-ft. vacuum table for skin mill was cast, fabricated, machined and assembled—with all controls installed.

Need a reliable source for SPECIAL steel products?

Every product on this page is from National Supply's Torrance plant—the largest completely integrated machinery manufacturing plant in the West.

Each is typical of the many big, specialized jobs we handle daily—for customers throughout western industry. Complete facilities, engineering skill and experienced plant operators are the vital ingredients we bring to every job assignment. May we use them for *your* special steel product needs?

THE
NATIONAL SUPPLY
COMPANY

INDUSTRIAL PRODUCTS DIVISION
Torrance, California • Los Angeles Area

Ideal Pressed Steel Forgings • Billets and Large Bars
Steel Castings and Special Machinery
Melting • Forging • Casting • Machining • Heat Treating
Assembling • Welding • Testing

4-shaft gear box assembly, a National job from design to delivery, was built for a gear speed ratio of 543 to 1.

7,000-lb. alloy steel cone forging was easily handled on a special mandrel and finished to the customer's specifications.

. . . for more details, circle No. 20 on Reader Service Postcard

Cleats reduce slipping on football fields, but–

WALK and WORK SAFELY

on low-cost A.W. SUPER-DIAMOND

ECONOMY ROLLED STEEL FLOOR PLATE

Forty raised steel figures to the step are your assurance of foot safety. Secrets of SUPER-DIAMOND's anti-slip protection for men and rolling equipment are the diamond design and alternate spacing of figures at right angles and correct distances for maximum friction from any angle of approach. After years of usage, the diamond pattern still retains its safe, comfortable footing . . . still permits quick cleaning and draining.

Made from tough steel floor plate, SUPER-DIAMOND can be fabricated with normal shop equipment. There are no matching problems. Use it structurally, as an overlay or as a complete flooring.

No other floor plate can match A.W. SUPER-DIAMOND's *safety, durability and easy maintenance at so low a cost.*

A.W. SUPER-DIAMOND

ROLLED STEEL FLOOR PLATE

"The diamond in the rough . . . a gem of a flooring."

ALAN WOOD STEEL COMPANY

Conshohocken, Pa.

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Other products: A.W. ALGRIP Abrasive Rolled Steel Floor Plate—Plates—Sheets —Strip—(Alloy and Special Grades)

For plants where oil, water and grease raise special problems of slipping accidents, we suggest a check on the special qualities of A.W. ALGRIP . . . the world's only abrasive rolled steel flooring.

. . . for more details, circle No. 21 on Reader Service Postcard

WESTERN MEETINGS

. . . continued from page 22

May 6-8—AMERICAN STEEL WAREHOUSE ASSOC., INC., Hotel Mark Hopkins, **San Francisco.** Contact Walter S. Doxsey, president, 442 Terminal Tower, Cleveland 13, Ohio.

May 9-10—WESTERN MATERIAL HANDLING CONFERENCE AND EQUIPMENT SHOW, sponsored by L. A. Chapter of American Material Handling Society, Western Livestock Exhibition Auditorium, **Los Angeles.** Contact Jack Jones, Show headquarters, 1501 Oregon Ave., Long Beach 13, Calif.

May 12-13—CALIFORNIA STATE ASSOC. OF POWER ENGINEERS, fifth annual convention, De Anza Hotel, **San Jose, Calif.** Contact Basil Fenn-Anstruther, president, 609 Seaview, Laguna Beach, Calif.

May 14-16—PACIFIC COAST ELECTRICAL ASSOC., annual convention, Last Frontier Hotel, **Las Vegas, Nev.** Contact V. W. Hartley, 530 W. Sixth St., Los Angeles 14.

May 16-20—NATIONAL PAPER BOX MANUFACTURERS ASSOC., Hotel Mark Hopkins, **San Francisco.** Contact G. L. Nordstrom, executive secretary, Liberty Trust Bldg., Philadelphia 7, Pa.

June 25-29—AMERICAN INSTITUTE OF ELECTRICAL ENGINEERS, Fairmont Hotel, **San Francisco.** Contact H. H. Henline, secretary, A. I. E. E., 33 W. 39th St., New York 18, N. Y.

July 10-12—6TH WESTERN PACKAGING AND MATERIALS HANDLING EXPOSITION, Pan Pacific Auditorium, **Los Angeles.** Contact Clapp & Poliak, 759 Monadnock Bldg., San Francisco 5.

Aug. 5-7—NATIONAL INDUSTRIAL COUNCIL (INDUSTRIAL RELATIONS ASSOCS.), Sheraton-Palace Hotel, **San Francisco.** Contact Donald L. Mewhinney, director of public relations, 918 16th St., Washington 6, D. C.

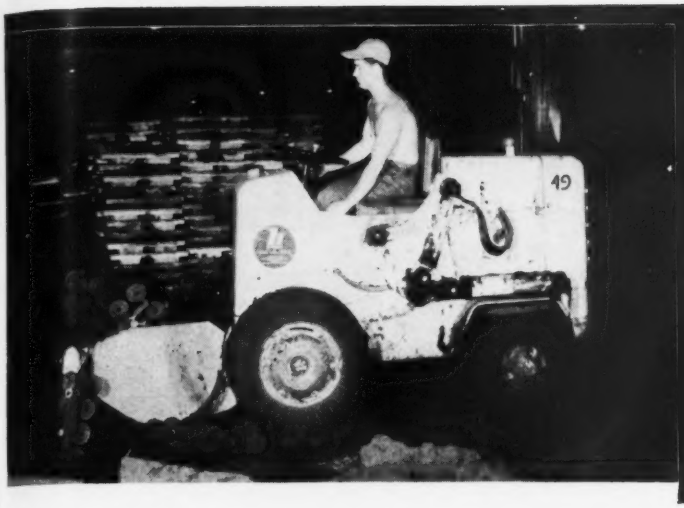
Sept. 11-13—PACIFIC COAST GAS ASSOC. ANNUAL MEETING, Hotel del Coronado, **Coronado, Calif.** Contact Assoc. offices, 2 Pine St., San Francisco 11.

Sept. 16-22—AMERICAN SOCIETY FOR TESTING MATERIALS, 2d Pacific Area National Meeting and Apparatus Exhibit, Hotel Statler, **Los Angeles.** Contact Bert Folda, chairman, promotion and publicity committee, c/o General Petroleum Corp., Box 2122, Terminal Annex, Los Angeles 54.

Sept. 23-29—NATIONAL ASSOC. OF ELECTRICAL CONTRACTORS, national convention, **San Francisco.** Contact Clint J. Harder, secretary-treasurer, 1200 18th St., N.W., Washington 6, D. C.

Oct. 1-4—AMERICAN MINING CONGRESS (Metal Mining-Industrial Minerals Convention and Exposition), Shrine Exposition Hall, **Los Angeles.**

Want further info about any meetings listed above? Write: Editor, Western Industry, 609 Mission, San Francisco.



..."the **PAYLOADER**® came out way on top. the two HA's with roll-back buckets are doing better than ⅓ more work than machines without roll-back action."

(Signed) WILLIAM MCCAIN, *Foreman*
Ohio Stove Company
Portsmouth, Ohio

Best for your operations too!

..."believe the new model HA **PAYLOADER**® the best machine for our operations."

(Signed) E. F. STOLPE, *Owner*
Penna. Malleable Casting Co.
Lancaster, Pa.

Foundries and metal-working plants far and wide are expressing their satisfaction with the performance of the new-design model HA "PAYLOADER". Built to scoop-up and carry more material for its weight than any tractor-shovel near its class, the new HA is way ahead of the field in the *kinds* of work it can do — in the *amount* of work it can do.

Torque-converter drive; full-reversing transmission; 40-degree bucket tip-back at ground; closed, pressure-controlled hydraulic system with built-in shock absorber... these are but a few of the many tried and proven plus values in the new HA that contribute to its leadership in performance, low maintenance and long life. Your Hough Distributor is eager to show you what the new HA or a larger "PAYLOADER" can do for you.

PAYLOADER®
MANUFACTURED BY
THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

For higher lifts and more production a bigger front wheel drive unit — model HAH 1 cu. yd. capacity.

THE FRANK G. HOUGH CO.
889 Sunnyside Ave., Libertyville, Ill.

- ☐ Send data on Model HA (1⅛ cu. yd.)
- ☐ Send data on Model HAH (1 cu. yd.)
- ☐ On larger models up to 2 cu. yd.

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Title
Company
Street
City
State

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... for more details, adv. pg. 28 & 29, circle No. 23 on Reader Service Postcard →

HOW YOU CAN SAVE
THIS ALL-PURPOSE

ANOTHER DENISON FIRST
DENISON MULTIPRESS
SIMPLE TO INSTALL
Only 24" high, 12½" wide, 19½" deep.
EASY TO SET UP
Ram pressures to one-ton with peak operator safety.
8" OF DAYLIGHT WITH 3" STROKE
for easy setup of dies and fixtures.

VE MONEY WITH SEPRESS

New!
1-TON DENISON
Hydraulic Multipress®
featuring pressure reversal

Industry's most versatile production tool that:

SIMPLIFIES OPERATIONS because Multipress cuts down operator fatigue. There is no pulling of levers . . . no kicking pedals.

INCREASES PRODUCTION because Multipress cycle time is *faster.*

PRODUCES HIGHER QUALITY WORK because ram pressure and time dwell are precisely duplicated *on every stroke.*

IS COMPLETELY SAFE TO OPERATE . . . safeguards against accidental tripping.

And gives you these plus benefits:

Precision ram alignment with tools and fixtures.

Faster setup with plenty of daylight. Easier adjustment of ram pressure.

Longer die life because Multipress eliminates damage to tools through improper loading of parts.

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DENISON ENGINEERING COMPANY
1160 Dublin Road • Columbus 16, Ohio
A Subsidiary of American Brake Shoe Co.

DENISON Hydr OILics

FOR

Small Assemblies
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Steel
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MY APPLICATION

Type of Operation	Type of Material
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☐ Marking	☐ Brass
☐ Punching	☐ Aluminum
☐ Trimming	☐ Plastic
☐ Broaching	☐ Glass

☐ Have Salesman Call

Company Name _____

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Position _____

WANTED: MORE SKILLED WORKERS FOR THE WEST'S MANUFACTURING PLANTS. The West's aircraft, electronics, and other durable goods industries are gobbling up every available qualified man, but still not turning up enough to meet relentlessly increasing demand.

Symptoms of the almost frantic competitive scramble for workers are most apparent in Southern California. Nearly 20 solid pages of help-wanted advertising in the January 29 edition of a Los Angeles newspaper were a record for the area. From far off Toronto, Canada, came

NO UNEMPLOYMENT BLOTCHES ON THE WESTERN MAP show up, except at Tacoma, Wash., in this representation of the country's 84 areas of chronic unemployment identified by latest Bureau of Employment Security reports. While the rest of the U. S. debates about ways to provide aid to labor distress areas, the West scrambles to meet its chronic labor shortages. (Map reproduced by special permission from Jan. 28 issue of Business Week.)

the plaint of A. V. Roe Canada, Ltd., an aircraft parts manufacturer, that workers were being lured away by California companies who were offering 100% wage boosts that A. V. Roe could not hope to match.

It was ironic that the West talked chronic labor shortages while the rest of the U. S. talked and debated about areas of chronic unemployment. Of 84 "pockets of chronic unemployment" and areas of large labor surplus in the U. S. pinpointed by the Bureau of Employment Security, only one was in the West, at Tacoma, Wash. (see map.)

●

$100 CASH AWARDS FOR REFERRING ENGINEERS is the latest technique introduced by Northrop Aircraft for locating and recruiting qualified men. Under terms of the plan, initiated in December, each Northrop employee not directly associated with the firm's hiring program can refer applicants by providing them with referral cards on which he has indicated his name, department, number, and date. The applicant then presents this card when he applies at Northrop offices. Ninety days after a referred applicant is hired on a permanent, full-time basis, Northrop's industrial relations department arranges for the $100 payment to the man responsible for the referral, as indicated on the card.

Announcement of the plan just before the holidays received an enthusiastic response from employees. An initial supply of 200 cards was exhausted the first day.

●

RIGHT TO WORK INITIATIVE IS BEING FILED IN WASHINGTON, to be put up to the state's voters next November (laws restricting compulsory union membership agreements are commonly called "right to work laws.") Initiative filed in Washington, if approved by voters, will make it illegal to require union membership as a condition of employment.

The Washington Right to Work Committee, supporting the initiative, is composed of 267 individuals throughout the state, 86 of whom are union members.

At present, 18 states primarily in the West and South have enacted some form of right to work laws. If you would like to receive a 32-page discussion entitled, "The Legal and Moral Basis of Right to Work Laws," write to The National Right To Work Committee, 35 Rust Building, Washington, D. C., or circle No. 300 on this month's Reader Service Postcard, page 67. There is no charge for a single copy. In quantity, copies can be obtained at 5 for $1.00, 25 for $4.00, and 100 for $15.00.

●

WHAT'S HAPPENING TO THREE-WEEK VACATION PLANS? Latest California figures show that almost half of all California workers employed under collective bargaining agreements can now expect a three-week vacation with pay after 15 (and often fewer) years on the job. This was revealed by a California Department of Industrial Relation's survey of 1,484 union contracts covering about 1,350,000 workers.

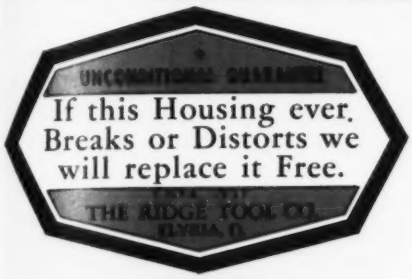
Fifteen years was the service period required for 72% of the workers. For another 21%, the qualifying period was 10 yr. or less.

●

NEW BOOKS TO HELP YOU WITH YOUR LABOR PROBLEMS are the following: **How to Lead Men** records the opinions of a five-man panel representing business and labor before a recent Western management conference, spelling out their ideas on leadership to get results and citing many instances in companies where good leadership skills are recognized and encouraged. Covering 10 pages, it's available from the California Personnel Management Assoc., 2180 Milvia St., Berkeley 4, Calif., at $1 per copy (ask for Management Report No. 219) . . . **Supervisory Management** is a new monthly magazine for foremen and supervisors in industry, published by the American Management Assoc. Each issue will contain 60 to 70 pages of articles designed to improve supervisory efficiency. For example, first issue out last December takes up such sub-

. . . continued on page 34

Even without this famous guarantee



Genuine RIDGID

would still be the World's Most Popular Pipe Wrench

. . . and no wonder— millions of users know it out-performs, out-lasts all others!

It's the "RIDGID" name that guarantees you everything you want in a pipe wrench—instant bite on the pipe, instant let-go—it can't lock, assured by patented hookjaw suspension . . . handy pipe scale, easy-spin adjusting nut, comfort-grip I-beam handle . . . and every one factory-tested before shipment! Always most for your money. . . your Supply House has them!

You get more quality and more-for-your-money in all RIDGID Pipe Tools.

RIDGID
Work-Saver Pipe Tools

The Ridge Tool Company • Elyria, Ohio, U.S.A.

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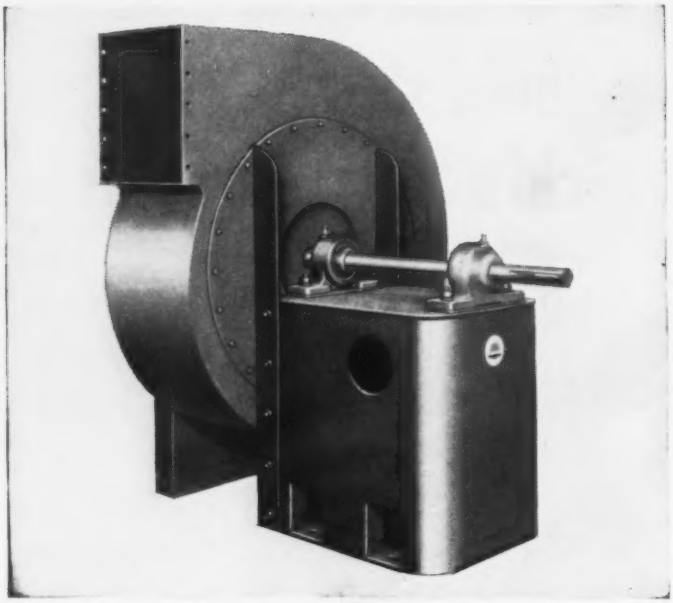
NEW FEATURES! HIGHER EFFICIENCIES! NEW "3-IN-1" DESIGN!

AMERICAN BLOWER SERIES 106 INDUSTRIAL FAN



Series 106 Industrial Fan

Certified ratings! Pressures to 18" w.g.! Volumes to 125,000 cfm! Heavy construction! Choice of 3 special-duty wheels! You get all these features, and many more in American Blower's new Series 106 Industrial Fans.

Available in 16 sizes, each with a high efficiency rating. Series 106 fans offer a wide range of optional accessories and construction features to meet standard or special specifications – *or* you can buy it in 7 sizes as an efficient, heavy-duty "packaged" industrial fan, complete with motor, V-belt drive and weathertight running-gear enclosure.

Get complete data from your nearest American Blower Branch Office, or write for Bulletin 5306-H.

CERTIFIED RATINGS

Certified ratings are the result of tests made by the Manufacturer in accordance with the Standard Test Code for Centrifugal, Axial and Propeller Fans adopted jointly by the National Association of Fan Manufacturers, Inc. and the American Society of Heating and Ventilating Engineers.

AUTHORIZED BY N A F M

© 1955 NATIONAL ASSOCIATION OF FAN MANUFACTURERS, INC.

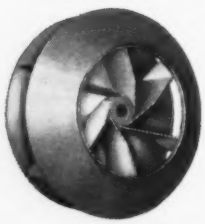
Certified Ratings

Air deliveries are in accordance with Standard Test Code for Centrifugal and Axial Fans adopted by Canadian Fan Manufacturers and American Society of Heating & Ventilating Engineers

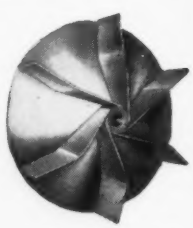
CFM

Choose the wheel to fit the duty

Air Handling – for efficient handling of air, fumes, or gases – either clean, or containing light concentrations of dust or materials.



Material Handling – efficiently handles air or gases containing granular material – dust grain, exhaust from buffing or grinding wheels.



Long Shavings – specially designed for conveying or handling air or gases containing long stringy material – wood shavings, fibers, alfalfa.

American Blower products serve industry

- Air Conditioning, Heating, Ventilating Equipment
- Mechanical Draft Equipment
- Industrial Fans and Blowers
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- Gyrol Fluid Drives
- Dust Collectors
- Refrigerating Machines

AMERICAN BLOWER CORPORATION, DETROIT 32, MICHIGAN
CANADIAN SIROCCO COMPANY, LTD., WINDSOR, ONTARIO

Division of AMERICAN-Standard

AMERICAN 75 ANNIVERSARY YEAR 1881 - 1956 **BLOWER**

. . . for more details, circle No. 25 on Reader Service Postcard

This press at Kenworth's Seattle plant, is stretching 19-gauge USS Steel Sheet and at the same time shaping it . . . a process that puts any material to a severe test. The section being formed here will eventually ride the highways and logging roads as part of the cab housing on Kenworth Tractor units like the one shown at right.

When your job calls for a special steel

USS Metallurgists see that you get it

For some jobs just any steel will do. But not always . . . not when you have deep draw problems or require difficult shapes like those produced by Kenworth's stretch press. These conditions usually call for a steel with special characteristics. And that's where our metallurgists came in . . . they made sure that Kenworth had the one right steel for the job.

By finding out how you use steel, USS Metallurgists can tailor-make a steel to fit your job requirements. Steel that's made this way, *for a specific purpose*, is the kind of steel that makes your production line run smoothly, reduces rejects and adds to the quality of your finished products. The same metallurgical assistance that helps Kenworth, is available to all customers of United States Steel.

free booklet! WI-3

UNITED STATES STEEL CORPORATION
COLUMBIA-GENEVA STEEL DIVISION
120 MONTGOMERY STREET
SAN FRANCISCO 6, CALIFORNIA

Please send me your free handbook that gives information on the production, properties and characteristics of steel sheets.

*Name*_____

*Address*_____

*City*_____ *State*_____

USS Steel Sheets

USS

UNITED STATES STEEL

. . . for more details, circle No. 26 on Reader Service Postcard

* Buy Victor and get Torch Versatility

Cutting with VICTOR Model 300 Series Torch Butt and Model 2450 Cutting Attachment; cuts to approximately 8"

The versatility of VICTOR torches means you can buy exactly what you need for today's job, then add other nozzles, tips and attachments as required. Your equipment grows with your needs; stays custom-fit to your work. For example, here are a few of the 34 standard attachments for VICTOR 300 Series Torch Butts.

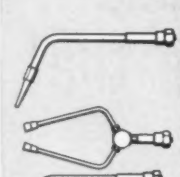
Welding . . .
Here's one of 10 standard single-tip nozzles available for general welding and preheating.

Heating, Brazing . . .
You have your choice of 11 standard multiple-tip or multi-flame nozzles for preheating, brazing, silver soldering, etc.

Descaling, Flame Priming . . .
Save time and money with VICTOR attachments that fit your exact needs.

Automatic Gas Saver . . .
Shuts off welding gas, keeps pilot light on, saves as much as 75% of total gas consumption.

Nozzle Extensions . . .
Let you handle hard-to-reach jobs, keep you



Start *right*. Buy the versatile VICTOR torch that grows with your job. See it at your VICTOR dealers *today* . . . or write NOW for Catalog 20.

16

VICTOR EQUIPMENT COMPANY VICTOR for welding

Mfrs. of welding & cutting equipment; hardfacing rods; blasting nozzles.

844 Folsom Street, SAN FRANCISCO 7 — 3821 Santa Fe Ave., LOS ANGELES 58

. . . for more details, circle No. 27 on Reader Service Postcard

LABOR NOTES

. . . continued from page 30

jects as work sampling, grievance handling, production control, motivation of employees, arbitration, and the supervisor's role in community relations. Subscription price is $7.50 per year to non-members of AMA, $6.50 to members. Contact the AMA at 1515 Broadway, Times Square, New York 36, N.Y. . . . **Effective Communication on the Job** is a new AMA handbook covering problems faced by executives and supervisors, including such topics as introducing the new employee, giving orders, reprimanding, talking safety, handling rumor, and reporting to upper management. It's $5.50 from the American Management Association at the address given with the item above . . . **Unemployment Insurance Schemes** is a 254-page manual presenting an exhaustive analysis of all the major aspects of this important branch of social insurance, both from the point of view of its underlying principles and by means of a precise comparison, in tabular form, of the various schemes in operation throughout the world. This one is $1.50 from International Labor Office, Washington Branch, 917 15th St., N.W., Washington 5, D. C.

•

1955 EARNINGS OF FACTORY WORKERS ROSE TO RECORD HIGHS in California, while working time averaged the longest in three years. Hourly earnings in factory production workers averaged $2.11 in 1955, topping by 8 cents the previous record in 1954. The gain reflected increased overtime as well as wage-rate increases.

Factory working time averaged 40½ hr. per week in 1955, more than half an hour above the 1954 average and the longest workweek since 1952, according to figures compiled by the California Division of Labor Statistics and Research.

•

WORK STOPPAGES IN CALIFORNIA INCREASED in 1955 by about 20% from the unusually low level of strike activity in 1954, according to preliminary figures released in mid-January. Some 245 stoppages began in 1955, compared to 206 in 1954. Present estimates are that 150,000 California workers were involved in work stoppages in 1955, 88,000 in 1954, 210,000 in 1953, and 234,000 in 1952.

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CALIFORNIA MANUFACTURING EMPLOYMENT INCREASED 2½ TIMES IN THE PAST 15 YEARS, says Ernest Webb, California Director of Industrial Relations, and the state's entire work force has more than doubled. From an average of 1,931,800 in 1940, the number of non-farm workers rose to 3,116,400 in the war year 1944; dropped off after the termination of World War II, averaging 2,961,300 in 1945.

During the next five years the work force gradually mounted, except for a small drop in 1949; then after Korea, rose rapidly to reach 3,876,900 in 1953. After the slight dip in 1954, growth was resumed to the present level, with employment now well over the 4,000,000 mark.

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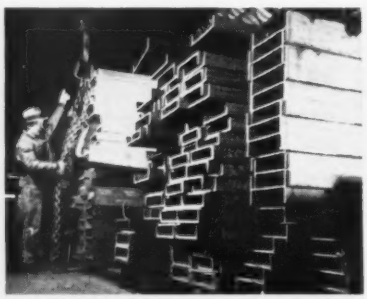

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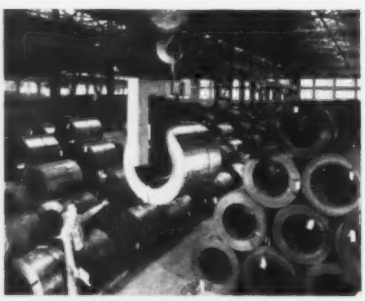

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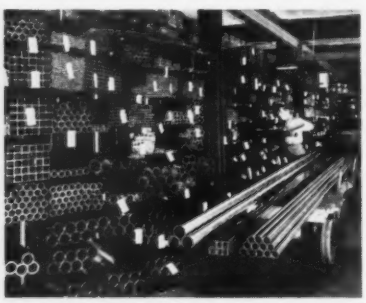

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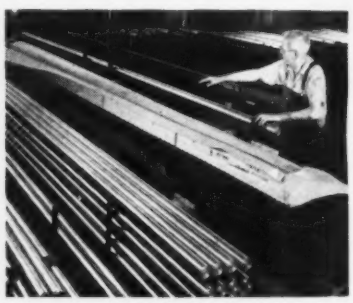

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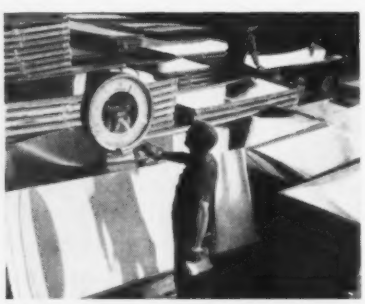

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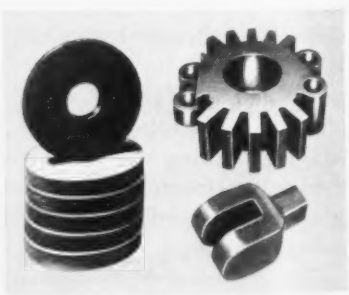

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- **"I do not believe that 'practical stuff' should be or can be properly taught in a university." Rear Admiral H. G. Rickover, USN Chief, Naval Reactors Branch Div., Reactor Development.**

- **"The best and quickest place for management to look over candidates to become supervisors or foremen is among the workers making up the production groups." James H. Hunter, Vice Pres., Manufacturing, Columbia Records, Inc.**

Western Industry
MARCH 1956

- **"... the properly trained and experienced foreman or supervisor is the master key that unlocks most production doors." W. W. Gilmore, President, Micro Switch Div., Minneapolis-Honeywell Regulator Co.**

- **"The West's aircraft, electronics and other durable goods industries are gobbling up every available qualified man, but still not turning up enough to meet relentlessly increasing demand." Labor Notes (See page 30, this issue).**

WHEN WANT ADS DON'T WORK

Train-'em-yourself takes over

On-the-job training is fast becoming the plant operating West's answer to an acute shortage of skilled manpower.

WESTERN plant managers and labor leaders alike are becoming increasingly aware that the training of workers and the supervision of such training is their own problem. Many hard facts that lead to a need for on-the-job training even for those new workers who have been college or trade school-prepared for their line of work are being recognized.

Plain and simple training needed

Management, in many cases, has been guilty of spending too much time, effort, and expense in exploration, qualification, etc., rather than in plain and simple training. What kind of training do we mean? All kinds, for all employees; for the apprentice, the journeyman, and for the technical personnel level. The management level too, if necessary. The training should develop skills, knowledge, and attitudes.

Any firm that has no manpower problems, no new products or changes in method of production, no new materials, no new policies, no accidents or grievances, no waste rejects or damage, is not in need of training. However, a static condition is indicated and such a condition is not welcomed by any company. Growth is necessary in any organization.

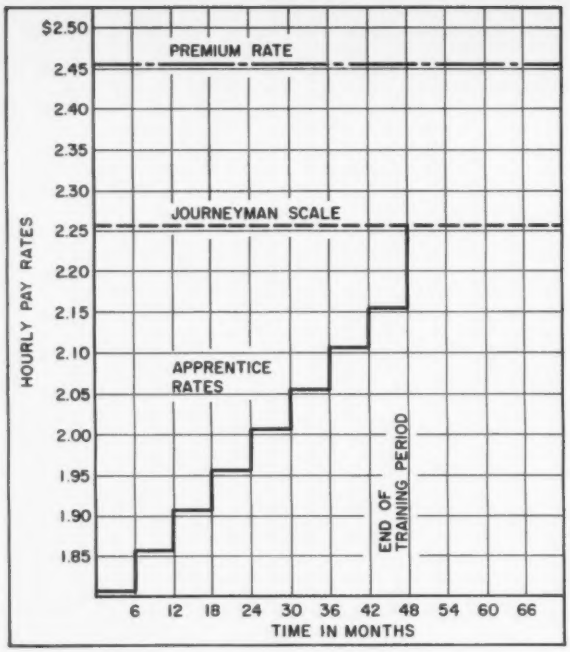
AUTHOR OF THIS ARTICLE

M. C. SANDES
Training Consultant
San Lorenzo, Calif.

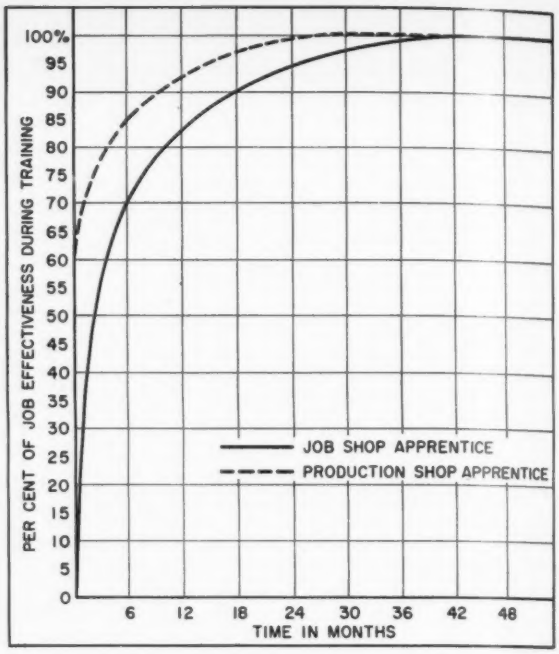
Skills need constant improvement

There are comparatively few unskilled or untrained people in any business enterprise. All personnel hired today have been partially trained either through schooling or through varied experiences on other jobs, in other occupations, in military service. However, the skills and knowledge of men must be constantly improved for any organization to survive in the competition of modern industry.

Training should extend throughout the entire organization. The scope of training should be extended to include



PROGRESSIVE WAGE SCALE of an apprentice molder and coremaker over the four-year training period as compared to the journeyman and premium pay rates.



PRODUCTION SHOP apprentices learn faster due to repetitive work involved. This scale presents average learning times needed by foundry apprentices.

the entire work force, in all job occupations. Plant managers should be as unwilling to clutter up their shops with sub-standard workers as they would be to maintain a sub-standard air compressor or furnace within their shops.

Some years ago the plant operating trend was toward simplification of jobs or skills. Specialists were seen to be the answer to the skill problem. Job operations were to be broken down into many components. Production would be higher, costs would be less, personnel hiring problems would be eliminated.

Now, training trend is broader

The last few years have seen a reversal of this. Large corporations and entire industries have encouraged or set up seminars for journeymen, helpers, technicians, and foremen to widen skills and trade knowledge. Some firms have established formal programs, other than apprenticeships, for training technicians. For instance, several of the automobile and electrical equipment manufacturers, as well as companies in the communications fields, have their own technical institutes. Student-employees attend part time in the evenings or on a combined work-study basis. Many firms, by covering all or part of the tuition costs, offer opportunities for employees to enroll in outside technical institutes or take correspondence courses.

Unions, too, have been active in promoting university extension classes, correspondence courses, and the like for their members to prepare them for future changes in their skills and occupations. Many unions play the most important role in the development and administration of apprenticeship programs. In addition, some of the printing, electrical, clothing, and other fields have established trade schools for training their members independently or in cooperation with employers. Recently the Steamfitters Union in the Bay Area promoted a series of lectures on atomic power and its application to piping and related problems. A forward move like this benefits both employers and employees.

The present practice of supplying apprentices with an intensive course in related information has been questioned. It is asked if it isn't a waste of time, that the knowledge is not needed and will not be used. This is short-sightedness, for the apprentice of today will see processes and machines that the present foremen never dreamed of!

The range of jobs at the technical and highly skilled level has become broader. Employment of professional men and technicians is increasing by considerable percentages. In a foundry recently visited, the total journeymen employed had dropped one-half but an almost like number of engineers and technicians in the design, electrical system, and hydraulic system fields had been added to the work force. The labor force was the same in number as before but the skills had changed and the resultant production was up 30%. In the meantime, a system of retraining was established for the journeymen retained, to fit them for the new machines, materials, and procedures.

Workers must be flexible

Capital equipment per worker is at a high level and apparently will continue to increase. The greatly increased capital investment per worker envisaged increases the risks of using workers with limited training. This has been evident for some time in many industries.

The lack of flexibility found in semi-skilled workers must be compensated by the increased employment of foremen, production technicians, inspectors, scheduling clerks, and trouble-shooters.

The need for workers who can shift functions and readily acquire new skills is evident. Since new technologies can be introduced as fast as the necessary manpower is trained, it is

important that workers have a broad foundation of basic knowledge and skills together with attitudes which will facilitate their learning new tasks as the need and opportunity arises. Some of the training given to employees may not become usable for some time and it must be regarded as an inactive investment until such time as it becomes useful.

Training programs entail some costs. But salaries paid the apprentices are for the work performed, not the amount of training performed by the employer. Some apprentice programs entail other costs. Apprentices are often paid for the hours spent in school, others are repaid their book and transportation costs. Several unions maintain a fund which covers any necessary books and equipment needed for classes.

Few employers regard the maintenance of an adequate supply of skilled and technical workers as a problem requiring exceptional attention. Many take it for granted that enough skilled workers are developed through a sort of natural process to meet normal needs. Rarely, if ever, is a salesman left to grope aimlessly on his job. Why is any other worker left in this position? Explicit and regular instruction is needed as much as repetition of work to develop a person's capabilities. Learning ability is dependent on the opportunities offered to learn.

Worker attitudes deteriorating?

Learning is a process of absorption. The trainee is a sponge; the skills and knowledge are the liquid. The sponge will only absorb the liquid if placed in contact with it. The trainee can not absorb the skills unless he is given contact with the varied work that will produce the skills needed.

A formal program of training develops workers for an occupation, rather than for a job, workers who have been systematically exposed to the whole range of situations which they are likely to encounter in their trade. The formal system deters supervisors and foremen from diverting the trainee to fulfill production needs. The broadly trained worker can usually adjust more easily to changing conditions. He is likely to be more versatile and plant management's task is made easier, because foremen are not compelled to match jobs to the skills of narrowly specialized workers.

Employers feel that there has been a marked deterioration in recent years in workers' attitudes. It is contended that workers are no longer governed by internal standards of work; that they display less of the old time willingness to please the boss; that cooperation is no longer spontaneous. The difficulty lies not in getting people to work hard in the physical sense—for machines have made this unnecessary—but in application to the job.

Until recently the study of the motives that lead men to seek training and employment in specific occupations has been dominated by a belief in the power of economic incentives. The differential between skilled and unskilled workers has declined by about half and observers argue that this development results in a shortage of workers willing to invest in training for skilled work.

Give workers an incentive

The size of the wage differential is only one factor among many others equally important. A job with social value and prestige is preferred. Desirable working conditions, ability to go into his own business, steadiness of employment and income, opportunities for advancement interest today's worker. All these are reasons for the lack of outstanding applicants for many trades. An incentive is needed for future candidates. The best possible training is such an incentive.

Let's take a look at the problems of today's foundry as indicative of today's training problems. The technology of machines in this industry is advancing so rapidly that the next 10 yr. will see more changes in foundry operations than the last five decades have. Tonnage of castings produced is rising each year, but the amount of skilled foundry manpower available is decreasing. U. S. Department of Labor statistics reports a decrease of 17% in skilled foundry manpower in the last 10 yr. (one of the reasons for its being placed on the critical trade list.) It is estimated that there are at most 2,500 apprentices learning the foundry trade and many of these not properly supervised on their training.

Present programs won't do it

The International Molders Union advocates a ratio of one apprentice for the shop and one for each eight journeyman. There are over 5,400 foundries in the United States and there are about 53,000 journeymen workers in the country. At quick glance, one may say that each shop could have from one to two apprentices. There are 2,500 in training; there should be from 5,400 to 10,000. The number finishing training will be much lower as there is a drop-out during training which is calculated at one and one-half out of four. A four-year training period means that only one fourth of the 2,500 minus the 35% drop-out will become journeymen in any one year. Roughly 450 new journeymen may be distributed among the 5,400 shops.

On the Pacific Coast not more than three dozen well-trained apprentices from planned programs join the journeymen ranks each year! This may be explained partly by the fact that there is increased reliance on new processes, mechanization and metal handling, but because of this, there is more employment of technicians, maintenance men, and engineers.

Good examples of planned training in the foundry industry lie in two Northern California plants, both occupied in the metal casting field but extremely varied in size and product. Separate and distinct training problems were encountered in setting up the two programs, but having accepted formal training, problems of lack of skilled workers have been solved.

The Oakland, Calif., plant of General Metals Corp. with 700 personnel has viewed the training of apprentice molders and coremakers as not only logical and acceptable but highly desirous for years. Producers of gray iron, malleable and steel castings of medium to large size, they have subscribed to the area Trade Standards and registered their apprentices with the State Division of Apprenticeship Standards. At present they are training about 20 apprentices under a program of 8,000 hr. (four years) of progressive on-the-job training.

Small plant training program

The Industrial Casting Corp., Berkeley, Calif., on the other hand, is a relatively new firm employing only a half-dozen people. This organization specializes in precision investment molding producing metal castings of fine dimensional accuracy. Use of a wax pattern, ceramic mold material, and melting metals such as stainless and alloy steels indicate out of the ordinary training techniques. Mr. Germann, president of the firm, desirous of training a worker to develop into an all around highly skilled craftsman capable not only of producing and maintaining the best possible product but also of transmitting the skills to and supervising the work of other personnel has developed a training program to fit the firm's present and future plans. A carefully selected worker has now finished three-fourths of a 4,000-hr. (two year) progressive on-the-job training program. The company is producing not only a skilled craftsman but also a potential supervisor.

20-pump fire control system for 5,000-acre desert plant

PROBLEM—*meeting extreme fire hazards at the world's largest jet aircraft manufacture-assembly plant.* SOLUTION—*two interlocking automatic water systems for deluge sprinkling.* RESULT—*unusually low fire insurance rates.*

HOW DO YOU go about providing a coordinated fire control system for a plant in the Western desert that sprawls over 5,000 acres, offers extreme fire hazards, has no established fire fighting facilities nearby, and with water supply from reservoirs limited?

These were the conditions faced in building the $30,000,000 U. S. Air Force Plant No. 42, Palmdale, Calif., world's largest center for the manufacture and testing of jet aircraft. The low insurance rates set for this giant aircraft center attest to the effectiveness of the double protection system that was installed. Here's the story.

The complicating factors

As with so many of today's industrial plants in the West, size and dispersion of facilities were big complicating factors in designing an adequate fire protection system for Palmdale. With four major aircraft companies—Lockheed Aircraft Corp., North American Aviation, Convair, and Northrop Aircraft, Inc.—jointly using the assembly and test center, buildings are spread out over 5,000 acres. In the photo at top of page, the Lockheed plant is located south of the runway system (an edge of which appears in the lower left corner of the picture). To the north, on the other side of the runway system, are the plants of North American, Northrop, and Convair. Obviously, an unusually large water distribution system was involved.

Further, water demands were very high. Because of the extreme fire hazard involved in the final assembly and testing of jet aircraft, deluge sprinkler systems in all hangars were a necessity. The extreme fire hazard also raised such other considerations as the need for alternate sources of water supply, alternate sources of power for the pumps, and provision for the automatic operation of both water supply and distribution system.

To provide water from two sources at any one point, yet avoid the heavy expense of a complete water main "loop" around the entire 5,000 acres, a unique system was devised using a separate pumping plant in each of the two major industrial areas, joined by two miles of 20-in. main. A solenoid-operated hydraulic valve installed in this interconnecting line serves to conserve water for the deluge sprinkler demand and keep each area independent except in emergency. The result is an operation equivalent to a "loop" system but much less expensive.

Each of the pumping stations comprises two underground wells and pumps, two reservoirs, three motor-driven fire pumps, three engine-driven fire pumps, two jockey pumps, and one pressure tank. Since the two plants are identical, the following description of Station No. 1 applies as well to Station No. 2.

Plentiful water supply

Two 24-in. diameter, 600-ft. wells and two 450,000-gal. prestressed concrete reservoirs insure Station No. 1 an ample supply of water for all requirements. Water is drawn from each of the two wells by a 9-stage, 12-in. Fairbanks-Morse vertical turbine pump with a capacity of 750 gpm. at 385 ft. TDH. Both pumps are pressure controlled from the reservoirs and go into operation, alone or together, to fill these concrete tanks when water drops below an established level.

Both well pumps are powered by 100-hp., 1,750-rpm., vertical, Fairbanks-Morse motors driving through right-angle gears and in addition, one pump has an alternate drive—

a butane engine operating through a Centric free-wheeling coupling in place of a clutch. In the event of electric failure, automatic controls by Custom Built Controls start the engine. It is this second pump with its dual power that is the prime source of water for fire fighting.

Six big fire pumps

To supply the maximum of 12,000 gpm. of water at a discharge pressure of 100 psi. considered necessary for the deluge sprinkler systems protecting the two industrial areas at Palmdale, six fire pumps are installed in each of the two water plants. All are 2,000-gpm. 8 by 10-in., single-stage F-M centrifugal fire pumps mounted on steel subbases.

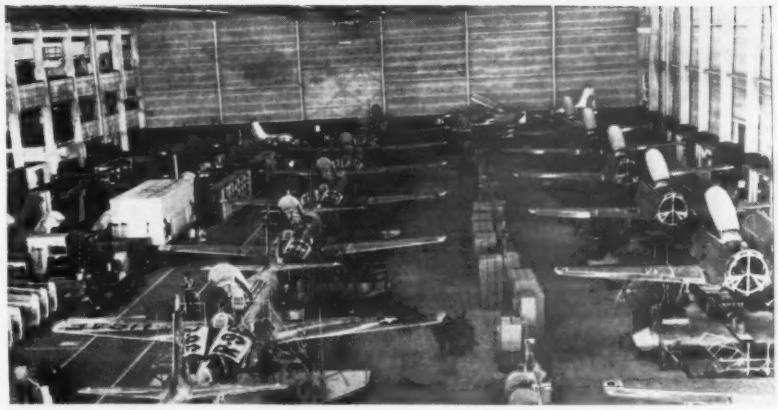
Three out of each set of six pumps are driven through flexible couplings by 150-hp., 1,750-rpm., 3-phase, 60-cycle, 440-volt, F-M drip-proof ball bearing motors. The three remaining fire pumps in each station are direct-connected through flexible couplings to three 6-cylinder, 779-cu. in. displacement Waukesha butane engines.

So that one of the big fire pumps will not start up to compensate for a minor drop in pressure in the 10,000-gal. tank at each station, (a drop such as might result from leakage in the lines), each of Palmdale's two fire protection pump houses is equipped with two 200-gpm. jockey pumps. These 2 by 3-in. single-stage F-M split-case centrifugal pumps are driven through flexible couplings by 25-hp., 3,460-rpm. motors.

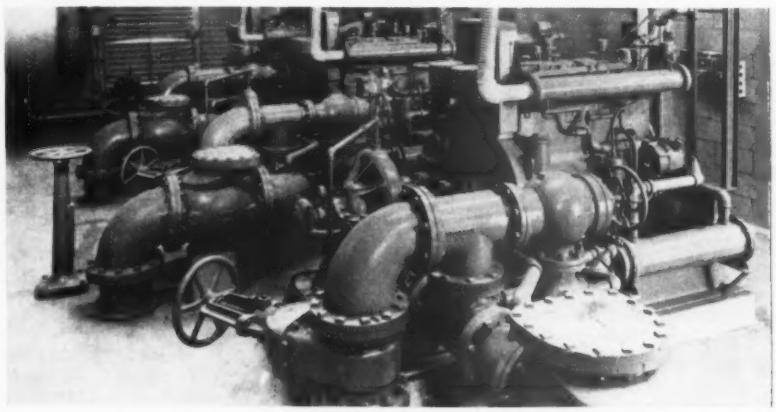
Automatic all the way

The entire water supply and distribution system for fire protection is completely automatic. The well pumps are activated automatically by a predetermined drop in the water level in the reservoirs. The first pumps are brought on the line automatically at predetermined pressure drops in the deluge system. At each station, first one motor-driven fire pump, then the second, then the third starts up as demand exceeds the capacity of the pumps in operation. If more water is needed than the 6,000-gpm. capacity of these three pumps, the engine-driven pumps come in automatically in sequence. In the event of power failure, controls are so arranged that the engine-driven pumps automatically take precedence over the motor-driven pumps.

If the demand for water is too great for the one station, then the solenoid-operated hydraulic valve in the interconnecting 20-in. main automatically opens and brings in the second station. This valve will also open if, while one of the pump stations is operating during a fire, the water in the two reservoirs in that plant, with a combined capacity of 900,000 gal., reaches the point where but 410,000 gal. remains. With the valve open, the active fire pump station shuts down and the other pump station starts up. The 410,000 gal. of water remaining in the reservoir at the first station will be pumped at any time on the demand of any of the deluge systems in the area. The valve in the interconnecting main can be operated from either station by a push-button control.



FINAL ASSEMBLY AREA for Lockheed T-33 jet trainers. Fire hazards attendant upon assembly and testing of the jets required the use of deluge sprinkler systems in all production hangars at Palmdale.



THREE 2,000-G.P.M. FIRE PUMPS at each station driven by butane engines have controls so that in case of power failure they come on the line first or immediately take over from motor-driven pumps.

Overall control system

There is double protection for the automatic operation of Palmdale's fire protection system. Auto-Con equipment, duplicated at each station, exerts primary control over the operation of all individual pump motors and engines. These motors and engines also have individual controls. Should the primary control of the Auto-Con equipment, which normally supervises the controls of motors and engines at both stations, fail, these individual controls function automatically.

As additional protection in case of fire, each of the four aircraft companies operating at Palmdale's jet aircraft assembly and testing center has its own fire department. The four fire chiefs each has a panel with indicators showing what fire pumps are operating and the line pressure as well as pressure drop alarms.

As prime contractor, Lockheed Aircraft Corp. selected the Los Angeles architectural and engineering firm of Pereira & Luckman to develop the master plan and engineering drawings for the Palmdale jet flight center in addition to designing the unique fire protection system.

Plastic pipe beats corrosion

. . . but, before using it, learn the "ins and outs." Here are some hard-learned facts based on a year's experience under tough corrosive and erosive conditions at a New Mexico uranium mill.

UNREINFORCED, rigid plastic pipe has been extremely successful in stopping corrosion from acid-ridden products handled by many Western plants. But, as is true of the application of any new product, there are several tricks and warnings that, if used, will simplify use of the product.

When Kerr-McGee Oil Industries, Inc. began to design its Shiprock, N. Mex., uranium mill, the decision to use rigid plastic pipe was made in spite of the lack of engineering data available on the product. Conveying acid slimes and solutions throughout other operations had given operators of the firm plenty of experience with corrosion and they found that the new plastic product could lick that problem at a cost considerably less than that for conventional lined pipe.

Now that the mill has been on stream more than a year, several hard-learned precautions to be observed in using plastic pipe can be listed as well as the benefits gained.

Unreinforced rigid plastic pipe has proved to be completely corrosion resistant and, within limits, erosion resistant. Relative smoothness of the pipe's inside surfaces coupled with a full internal diameter when compared with rubber-lined or other lined pipe of the same size, has decreased friction loss and minimized the build-up of troublesome scale deposits. The pipe is easy to cut, thread, and install, using conventional pipe tools. It is lightweight and an almost complete line of valves and fittings is available.

These suggestions will apply when using any of the common types of unreinforced rigid plastic pipe available on the market today.

1. Plastic pipe cannot be used for hot solutions. Although manufacturers will ordinarily recommend their pipe up to 150 deg. F., its use at temperatures above 120 deg. F. seldom proved feasible. There are hard rubber or special plastic pipes that are recommended up to 250 deg. F.; however, when operating at temperatures above 120 deg. F., both reinforced and unreinforced plastic pipe lose many of their advantages over lined or stainless pipe.

AUTHOR OF THIS ARTICLE

. . . is Eugene E. Woodward, plant metallurgist, Navajo Uranium division of Kerr-McGee Oil Industries, Inc. in Shiprock, N. Mex., where acid slimes and solutions involved in processing uranium and vanadium ores present the worst in corrosive conditions for piping.

2. Plastic pipe must be well supported. In sizes 3 in. and below it is suggested that the pipe be supported along its entire length by laying in angle iron which in turn can be supported in any convenient manner. Long vertical sections must also be supported at intervals of 3 ft. to 5 ft. In sizes 4 in. and over plastic pipe possesses good strength for weight characteristics and may be supported by pipe hangers on 4 to 6-ft. spacing.

3. Care must be taken in making up threaded joints. Plastic threads gall easily and should be well lubricated. For permanent installations, threaded connections may be welded by use of suitable solvents. Directions should be obtained from the manufacturer.

4. Plastic valves and fittings are not as tough as their lined counterparts, and must be handled carefully. Flanged joints should be taken up evenly and with no more tightening of the bolts than is necessary. Pipe should be carefully cut to fit so that there will be no unnecessary strain on flanges and fittings. In sizes 3 in. and below, a threaded connection is a mechanically weak point and should be protected from strain. An operation producing line hammer can quickly pound a plastic line to pieces.

5. Guard against erosion by proper initial design. When handling abrasive slurries, use long radius ells or two 45's to minimize erosion at the point of change in direction. When properly supported, rubber pinch valves work well in conjunction with plastic pipe.

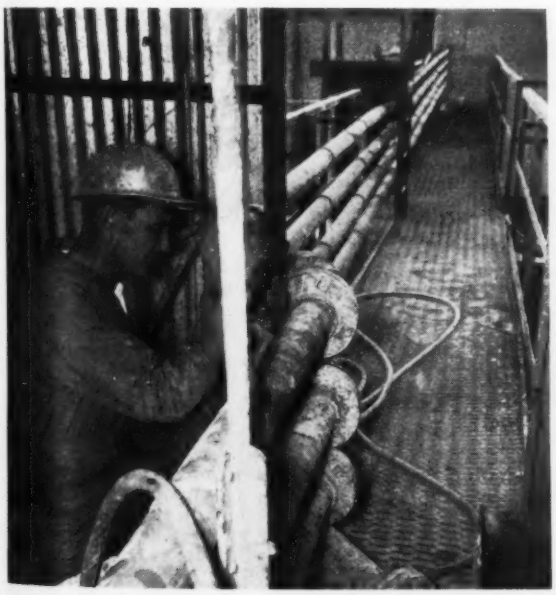
6. Watch excessive pressure. Be aware of the fact that ordinary grades of plastic pipe have relatively low working pressures. Check the manufacturer's recommendations.

7. Keep lines in the open and away from hot lines. Even lukewarm solutions can cause plastic pipe to sag or fail if it is enclosed or in any way prevented from dissipating heat.

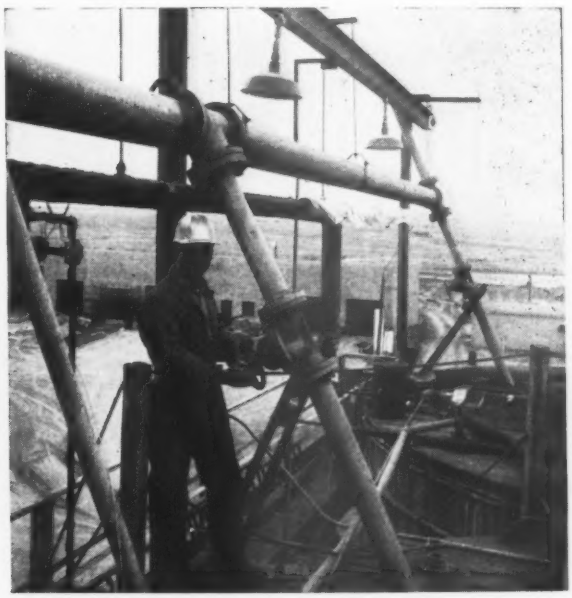
8. Watch for expansion when designing for wide temperature ranges. Plastic pipe has a surprisingly high coefficient of expansion and the layout should be designed to relieve any stresses from this source. If exposed to subzero temperatures, plastic pipe will fail readily from mechanical shock. If not drained, plastic pipe will burst on freezing.

RIGID PLASTIC PIPE and valves make up this pump discharge manifold for handling highly corrosive acid liquors in leaching section of the Shiprock mill.

EXTENSIVE SUPPORTING FRAMEWORK was needed for these valves and pipes in the thickener section. In 3-in. and lesser sizes, full-length support is necessary.

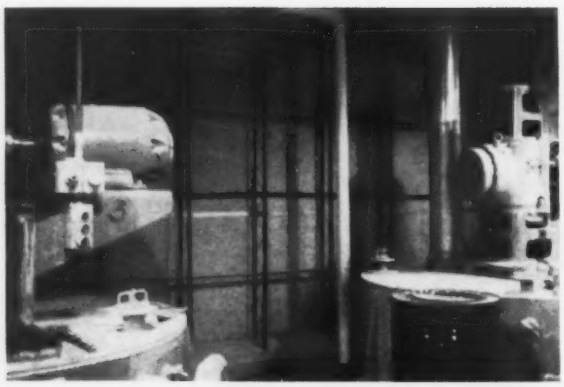


PIPES CARRYING ACID LEACH SLURRIES to the thickener section of the mill are open and away from hot lines . . . two specs for any such installation.



THIS RIGID PLASTIC HEADER and feeder set-up is used to carry acid uranium barren liquor to the vanadium tanks at the Kerr-McGee uranium mill in N. Mex.

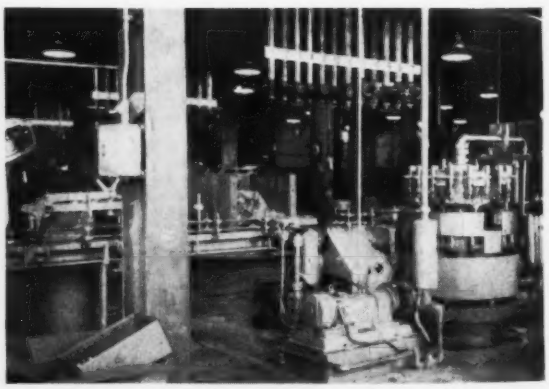
. . . but in case anyone entering the production department at R. M. Hollingshead Corp. can't read, this progressive Sunnyvale, Calif., manufacturer of maintenance compounds has built in several precautions to prevent serious injuries in case of explosion, fire, or spillage of the extremely volatile chemical materials handled. Take a look at these five:



1 Rock lath walling on the second floor of the Hollingshead plant is wired to the network of steel shown here. In case of explosion the walls would absorb the concussion by falling outward, thus reducing possibility of injury to workers. Ground floor walls are of cement construction, but large-paned, concussion relief windows are spaced closely. Thus a great percentage of the actual wall space on the ground floor is concussion relief.

Frames for the windows are held against the wall from the outside by small clips which act as shear pins and further insure an outward fall of windows.

Another construction safety feature is the segregation of offices and warehouse space from the production area by double fire doors and concrete walls. Power room which contains all electrical controls is also adequately saparated from production area.



2 All wiring, switches (note switch box mounted on post at left of picture), and electrical connections at Hollingshead plant are totally enclosed in conduit, steel boxes, etc. All joints and seams on these enclosures have been covered with compound to further eliminate spark ignition of the volatile gases in the atmosphere.

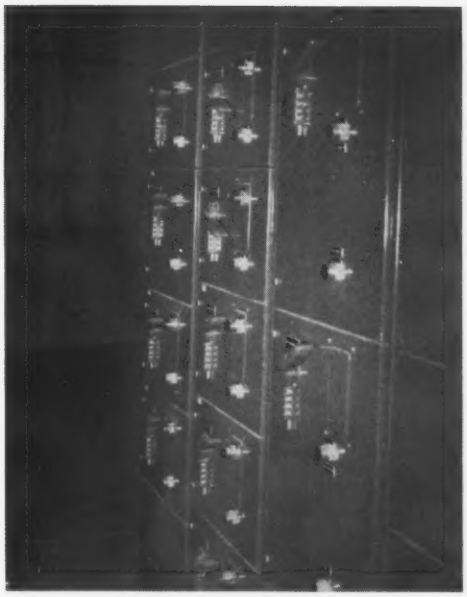
Further precaution has been taken by imposing a plant regulation that, under no circumstance, is any piece of non-explosion-proof equipment permitted in the hazardous production or mixing areas. Thus, lift trucks, unsealed electric controls, etc., are not used.

Such rules as this are initiated, reviewed, and enforced by a safety committee comprised of employees from each operating department. The committee meets on a regular basis to discuss the safety factor of the plant and means of improving that factor.

3 All electric motor starters for equipment in mixing department are located in the boiler room which is outside of the hazardous area. This room is separated from the areas containing volatile materials and gases by a fire wall and door.

As an extra safety measure, the controls here are all arranged so that a lock—for which there is only one key available—can be placed on the controls to lock them in an off position. Having locked the controls, an operator can go to the mixing or filling departments and work on equipment with the assurance that no one will inadvertently actuate the machinery.

In the mixing department this is of particular importance because it is necessary for workmen to descend into the mixing tanks and clean them. Another precaution is taken in this cleaning operation. A rope fixed around the waist of the tank cleaner is tied to the waist of another operator who remains above the tank. Thus, if the tank cleaner is overcome by fumes or injured in any other way, the man at the top knows immediately and can rescue his co-worker.



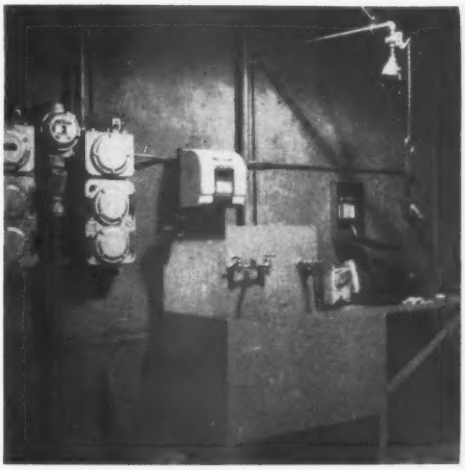
4 Due to the toxic fumes which necessarily are carried in the air in mixing and filling departments, an air conditioning and exhaust system has been installed which provides a complete change of air every 6 min. Shown at the right is one of the exhaust ducts which extends to within 6 in. of the floor. Maintenance compounds manufactured at the Hollingshead plant require the handling of acids and volatile materials.

The air conditioning blower provides fresh air from the ceiling height. During certain operations in these departments, it is also necessary for workers to wear protective masks to eliminate filtration of dust particles as well as the toxic fumes.

Fire fighting equipment in the plant includes an adequate number of extinguishers which will handle any type of blaze with their varied contents. Standard sprinkler systems have been installed throughout the plant, but the number of sprinkler heads per square feet has been increased in areas where extremely low flash point materials may be handled.

5 The safety station pictured here is located in the entrance corner of the mixing department. All of the necessary medicines and equipment with which an injured operator or his co-workers can administer first aid treatment are available. Boric acid eye wash, bandages, wash facilities, and overhead fire showers are its important components.

Overhead showers, actuated by a pull chain, are located throughout the Hollingshead plant in convenient doorways. If a worker's clothing should ignite, he can squelch the flames with the shower. Quick access to the shower is also imperative in case a worker is accidently splashed with caustic or other acid.



HAVOC shown here is only a sample of the $3,000,000 damage at Ford. Wood block floor buckled and floated away; oil film covered equipment and supplies; hundreds of electric motors were soaked.

ONLY 5 WORKING DAYS

From "ruin" to full operation

They told R. C. Armour, Long Beach Ford plant manager, his "back into production in 10 days" goal was impossible. He did it in five.

WHEN a nearby dike broke and the Ford assembly plant at Long Beach, Calif., flooded and then caught fire on January 27, many thought the plant would be "down" for two months, possibly three. R. C. Armour, plant manager, thought differently. "We'll be back in production inside of 10 days," Armour said.

"Knee-deep" emergency conference

Almost at the instant the flames were extinguished, Armour called a conference with plant supervisor personnel. Standing knee deep in water, the men discussed the problems.

Damages were estimated to be $3,000,000. Flood waters had carried an oil slick into the plant; wooden blocks surfacing loading docks had been washed away; hundreds of electric and air motors had been covered with water; hundreds of tons of parts and supplies necessary for assembling automobiles had been ruined; the power house was inoperative; the south end of the main assembly building had been scorched by fire, windows broken out; the paint storage building—where the fire had centered—was in a scorched and charred condition.

The first step in rehabilitating the plant was to pump off the flood waters. Barges were hired to pump out the water and filter off the oil slick.

Several hundred employees were called in and crews began working around the clock.

Diving for motors

C. H. Culbertson, manager of plant engineering, began removing electric motors before flood waters had been completely pumped out of the plant. Culbertson and his crew virtually dived for some of the motors.

Electric shops in the Long Beach area were contacted and offered the

job of reconditioning the motors, 10 at a time, on the basis that the motors be back to the plant in two days. When one group of motors was returned by a shop they were offered 10 more on the same basis.

Over 300 big electric motors that propel conveyors and automatic equipment were reconditioned. Some required rewinding or new bearings. All of them had to be greased, serviced, and fully checked. In addition several hundred small electric and air motors used in the assembly of cars had to be serviced.

Only 5 working days lost

A cement contractor was contacted and by Sunday morning, January 29, (only two days after the flood-fire!) cement crews were laying concrete to resurface loading docks of wooden block construction that floated away in the flood. In less than two days over 60,000 sq. ft. of concrete was layed.

While this was being done, crews were cleaning the oil film from walls and fixtures. The men first used a fire hose, then steam and ultimately all walls were washed down with a solvent and repainted.

Meanwhile, shipments of parts and supplies to replace those ruined in the flood were arriving at the plant by truck, rail, and air.

On Monday, February 6—only 10 days after the flood and fire—the plant resumed production of automobiles. In restoring the plant to normal production, with a loss of only five regular working days, the team of specialists and Ford employees may have established an unofficial record in industry-comeback from a near catastrophe.

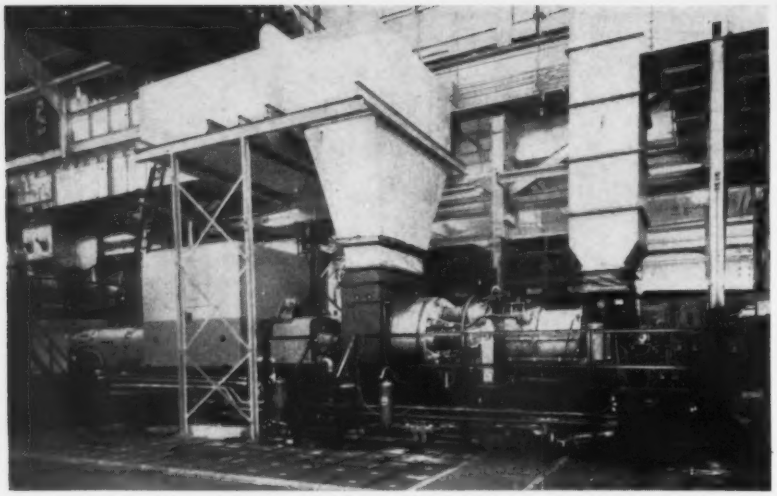
Teamwork did the trick

Plant Manager R. C. Armour had high praise for the teamwork that was exhibited by Ford plant employees who were involved in the plant restoration. Armour said. "It has been a wonderful experience to see the way our employees responded to our request for help to clean up and repair in order to get back into production. It is only because of that teamwork and devotion to duty that we were able to be back in business with a loss of only five working days," he concluded.

The Long Beach plant normally employs about 1,750 hourly and salaried persons on an annual payroll of over $9,000,000. The plant produces about 360 units during a regular 8-hr. shift. It was officially opened and has been in operation since 1930.

TWO DAYS AFTER THE FLOOD-FIRE, contractors were pouring over 60,000 sq. ft. of concrete slab to replace wooden blocks previously used as loading dock flooring at the Ford Long Beach plant. The wooden blocks floated away during the flood. Just two days pouring time was required to provide the two 900-ft. lengths of loading dock flooring.

MANNING A PLANT FIRE HOSE for almost four hours, Virgil Keck (right), plant engineering steamfitter, kept the fire from spreading through Ford's dead-records room and into the main assembly building. Talking to Keck above is R. C. Armour, plant manager, who praised the high degree of teamwork and the heroism displayed by Ford workers during the flood and fire and during the five-day-and-night clean-up period that followed.



ELECTRICITY AND STEAM representing 25% of the total power required for operation of the Gates Rubber plant in Denver, Colo., will soon be produced by a jet turbine unit similar to this one mounted on a test stand at the General Electric Schenectady Works.

First gas jet turbine for plant power

THE first gas jet turbine power unit ever used in industrial manufacturing will be installed shortly at Gates Rubber Co. in Denver. The unit will drive a generator to produce electricity for the plant, while its exhaust blasts will be used to produce steam for plant vulcanizing operations.

Costing over $1,000,000, the turbine will be installed in April or May, with actual operation scheduled to begin in July. Excavations for the project have been made in areas adjacent to the present power plant, and large tanks to store standby supplies of fuel have been embedded. Work is proceeding on enlarging the power house and installing a new outside-type boiler which will be used to generate the steam from the exhaust blasts of the jet turbine.

Here's how it works

Although new in its use at Gates, the turbine uses the oldest principle of power known to man—that of a "hurricane driving a windmill." Air is pulled in through a filter-silencer and compressed for the combustion chamber. A jet flame, burning gas or distillate, changes the compressed air into hot expanding gases which blow through two sets of turbine blades, called buckets. As the bucket wheels spin, they turn a shaft connected to the generator, which produces electricity.

Gates estimates that the gas turbine will produce about one-fourth of its total power demand.

Rather than let the exhaust from the turbine blow into the air and be lost, Gates will direct the blast into a boiler which makes steam for its vulcanizing processes.

Research leads to plant use

The gas turbine has already proved itself in other fields; there are over 100 units in use by utility companies, gas pipeline firms, and railroads. It was this success in other fields which led Gates to explore the possibilities of the turbine for producing more electric power as well as steam to meet increasing factory production demands. Research showed that the turbine would be more economical to install and operate than a steam boiler alone, and that it would meet needs for additional steam.

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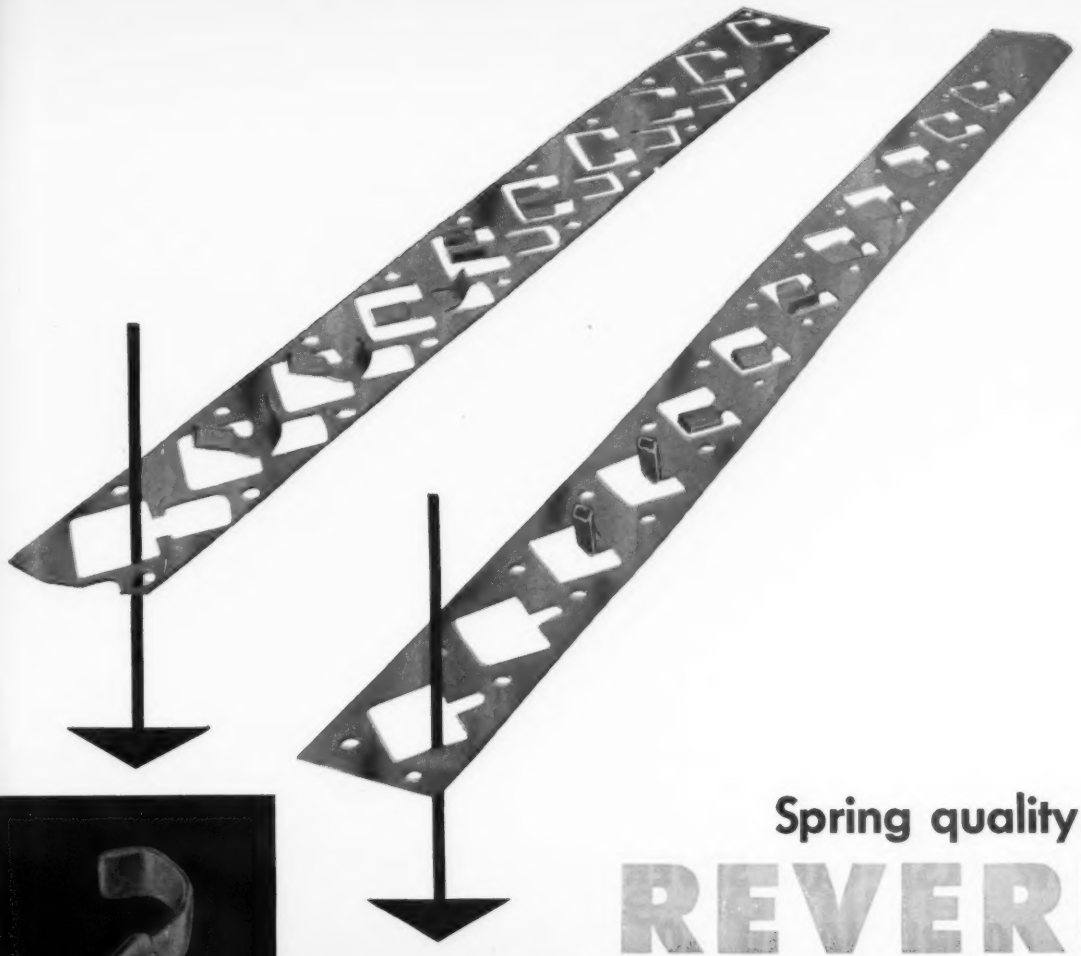

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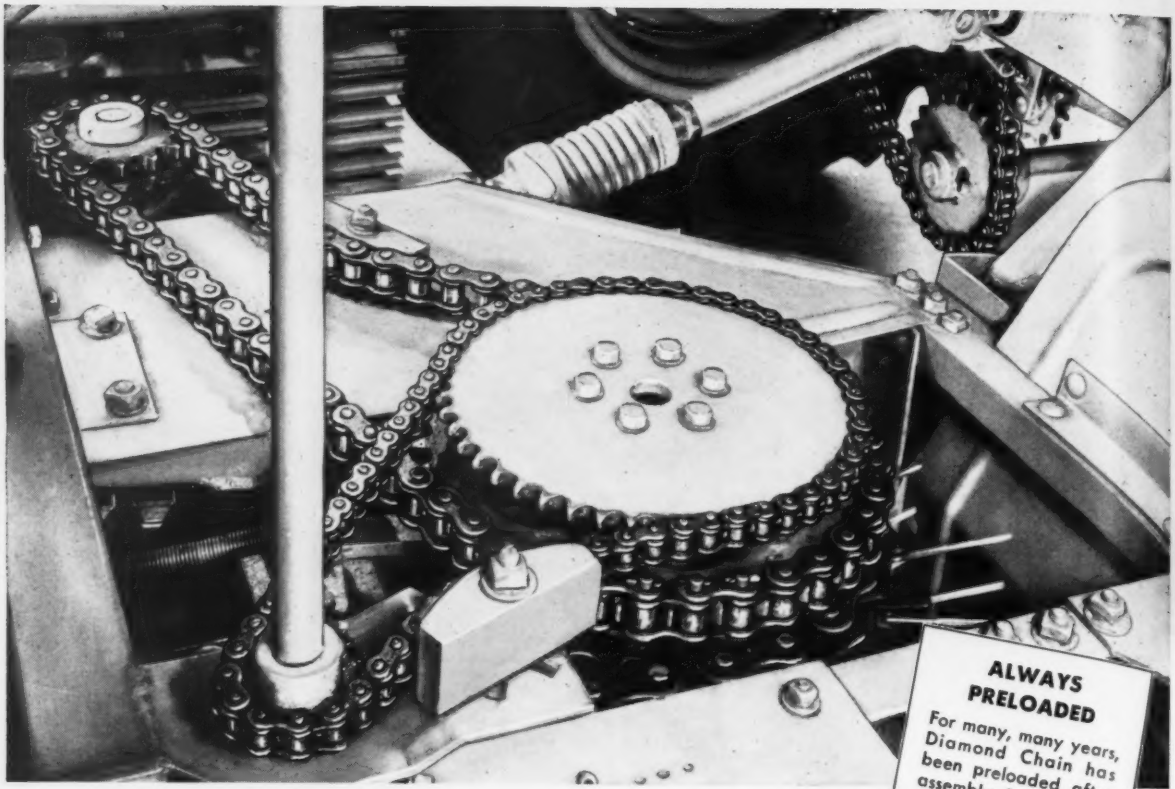

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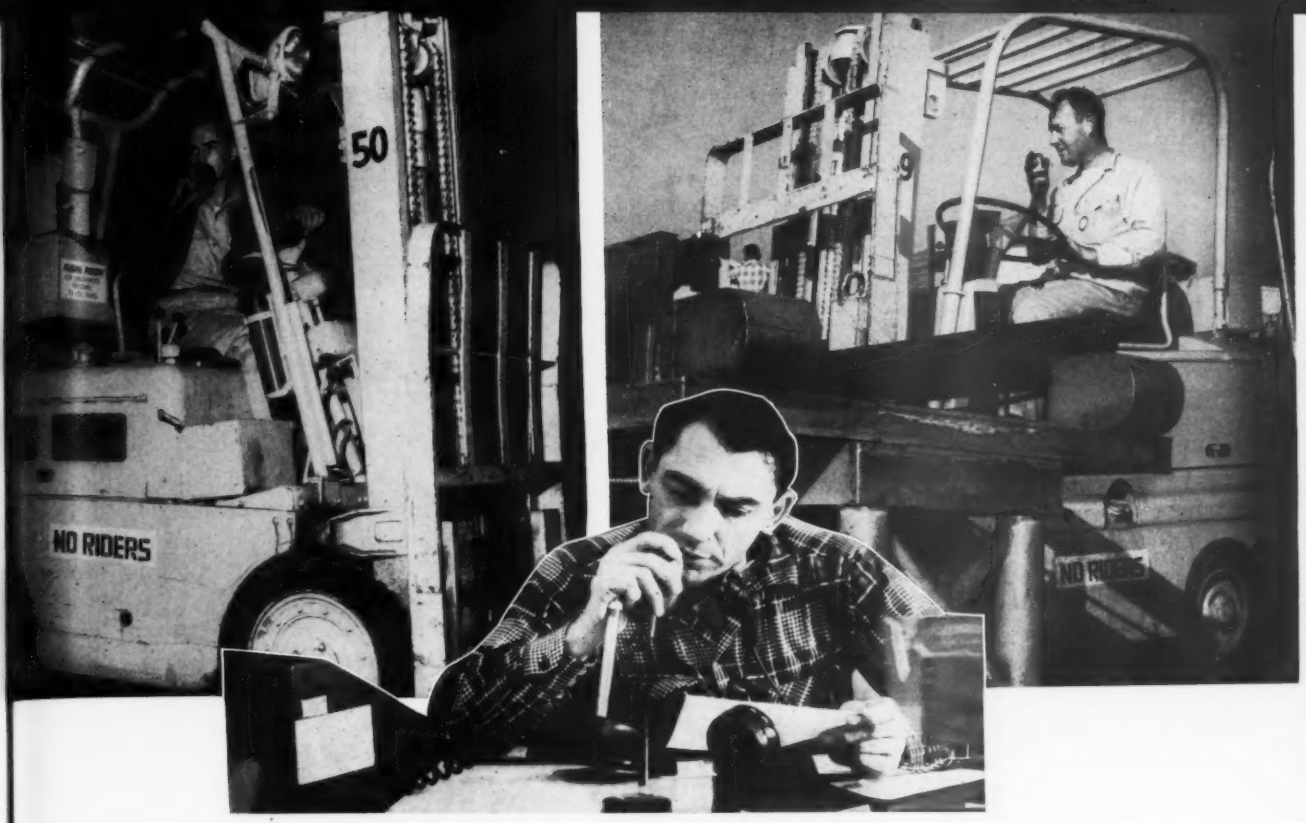

A switch from bike to mike

. . . and now the job of dispatching lift trucks is being handled 75% faster by radio at Rohr Aircraft. Here's how it works.

A 70-ACRE bicycle coverage of Rohr Aircraft's Chula Vista, Calif., plant has been boiled down to an arm-chair radio operator's job. Besides saving a lot of peddling, installing an inter-plant radio communication system to dispatch lift trucks to jobs has increased the efficiency and economy factors of the operation by 75%.

TRANSPORTATION DISPATCHER Louis Benventano, pictured at center above, transmits a "super hot" assignment to lift truck operator. Vehicle operators shown are Lyndon Hove, left, on the night shift, and Don Burnett.

"Work-horses" equipped first

Fork lift trucks were selected as the first vehicles to be equipped with the radio system because they are the "work-horses" of the plant's materials handling system. Approximately 250 different jobs are presented to each of the lift trucks every day. Jobs include loading and unloading all trucks, common carriers, and rail cars, and moving heavy machinery, jigs, boxed items, small building structures, work platforms, stock bins, etc.

Before the radio system was installed on the six lift trucks now using the system—reported to be the first of its kind in Southern California—a lapse of 25 to 30 min. occurred from the time a lift was required until the operator reached the job. Previous system involved giving the dispatch order to a leadman who covered the plant on a bicycle or motor scooter.

Today, a transportation dispatcher is contacted by phone when a lift truck is needed. He records the area nearest the job, and transmits the request data. When the job has been completed, the lift truck operator contacts the dispatcher by radio and the dispatcher records the time of job completion.

All jobs are coded to indicate urgency. Terms in order of importance are super hot, hot, mild, and general. Dispatchers make assignments in the order of the code on the request.

Drivers can talk to each other

A convenient feature of the radio inter-com system permits the highlift drivers to communicate with each other. Thus, when a driver in one area of the plant requires information from another regarding disposition or location of items moved, or items to be moved, he contacts the dispatcher and indicates which driver he would like to talk to. The dispatcher clears his call through and the needed information is obtained in a matter of seconds.

Current planning at Rohr calls for installation of the radio equipment on several other vehicles, those assigned to the plant's transportation department.

SPRAY WASHING with air-brush type gun, operator wears lint-free clothing and neoprene gloves.

ULTRASONIC WASHING, teaming with spray wash, does the best job if you have equipment available.

Tiny bearings need loving care

CHANCES ARE that you're having a lot more to do with miniature precision bearings in your plant these days. Automation progress means more electronic controls and wider use of instruments, with these fragile units as important mechanical components.

Knowledge of how to clean miniature bearings is important in the West both for plant engineers and for the region's many new firms which manufacture electronic equipment and instruments. To provide this specialized information, WESTERN INDUSTRY asked Miniature Precision Bearings to supply the following discussion of today's best procedures for cleaning precision instrument bearings.

Dirt is worst enemy

Dust, dirt, and corrosion are the enemies of all precision instruments. The performance of precision instrument ball bearings, which range in size from 1/10 to 5/16-in. OD, is particularly affected by lack of cleanliness. In order to provide high performance miniature bearings, the manufacturer of these precise, tiny mechanisms carefully cleans each bearing immediately prior to packaging them. If subsequently contaminated it is advisable for bearing users to also clean the bearings prior to use.

Due to their small size and high precision, extreme care must be taken in any operation during which miniature bearings are handled. Furthermore, effective cleaning is a highly specialized operation.

Floating dust can foul you up

All operations requiring handling of miniature bearings should be conducted under closely controlled environmental conditions. The area should be relatively dust free and cleaned periodically, according to a regular schedule. Personnel engaged in cleaning bearings should be clothed in lint free clothing (nylon smocks and head gear are recommended). Dust producing articles and activities should be prohibited in any area where the bearings are exposed.

Spray washing is an effective method of cleaning miniature ball bearings. The most satisfactory spray gun for cleaning the bearings is of the air-brush type with a spray pattern of approximately ½-in. diameter 3 in. from the nozzle at an air pressure of 30 to 40 psi. The fluid lines and fittings to the gun should be stainless steel and the air line should be equipped with a filter and moisture trap as close to the gun itself as practical. Solvent should be sprayed through new guns or new installations until no foreign particles can be observed on fine filter paper under 25X magnification. Guns should be disassembled, cleaned, and given a filter paper check for cleanliness daily.

Spray booths should be constructed of stainless steel, power vented at the back and provided with a suitable drain in the bottom to carry off excess fluid solvent. A typical spray booth is illustrated.

How to use cleaning solvents

Any cleaning solvent conforming to Military Specifications PS 661-B may be used with good results. All solvents should be passed through fine filter paper before being used. Solvent receptacles should be absolutely clean and dry before use.

Bearings should be demagnetized before spray washing. Each bearing is placed on a mandrel for cleaning. The operator, wearing neoprene gloves or finger cots, restrains the outer race and thoroughly wets the bearing with solvent before allowing the bearing to turn. Once it is thoroughly wet, blown through and flushed clean, the bearing is worked back and forth across the spray so that it rotates first in one direction and then the other. The

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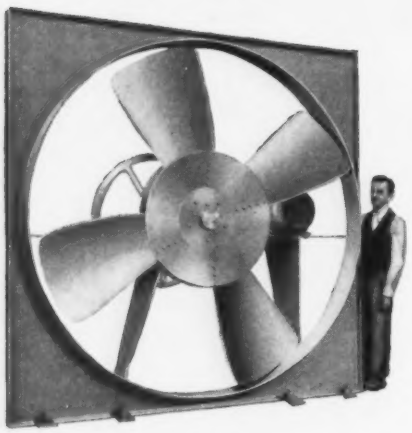

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mandrel is then rotated with the bearing oriented so that the spray is directed first to the inner ring ball groove and then to the outer ring ball groove. The bearing is washed from the opposite side by reversing the mandrel and repeating the entire process, with the bearing being retained on the mandrel with the tip of the finger.

Allow a minute per bearing

It should take at least 30 seconds to clean each side of a bearing. Compressed air is used to blow excess solvent from the bearing but no attempt should be made to thoroughly dry it, as this may cause formation of solvent skin on the surface. The bearing should not be rotated while being air blown.

If the equipment is available, ultrasonic washing may be advantageously combined with a spray-wash. The ultrasonic wash should be performed prior to spray washing. While in the ultrasonic wash the bearings are completely immersed in the solvent and agitated slightly. They are transferred from the ultrasonic generator to the spray wash booth without being removed from the solvent.

Clean bearings should be lubricated before the solvent can dry. One or two drops of instrument bearing oil are placed within the bearing using a hypodermic syringe with a No. 24 needle. The clean, lubricated bearings should then be placed in a clean dry petri dish and covered until ready for use.

Large cranes lubed in 5 min.

SAVINGS and other advantages of centralized lubrication on smaller and lighter cranes are equally as great as on large cranes.

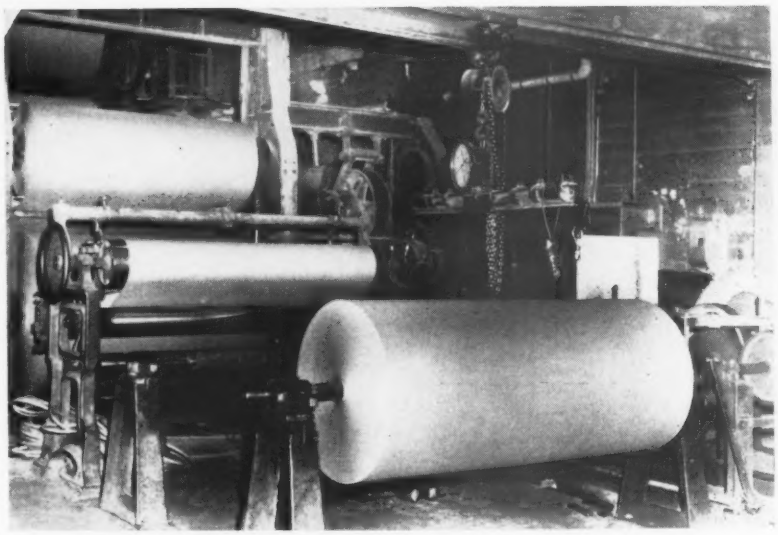
Economies on the larger cranes are exemplified in the new Ford Motor Co. San Jose assembly plant. As an oiler would have to reach daily about 30 lineshaft and trolley bearings, and operations would have to be halted about 40 minutes to do the job, a shutdown would be costly.

With the Farval centralized lube system supplied with the Whiting cranes, it takes the oiler about five minutes to lubricate each crane. He goes to one safe and conveniently located point on the crane's walkway, pumps up pressure with a hand lever, and the lubricating system does the rest.

Drying speeded 20% by gas burners

. . . when added to steam roller set-up at Pabco's paper backing operation.

SPEEDING production of paper backing for linoleum, roofing, felts, and similar products is a matter of reducing time required to dry the material, a paper product made from wood, paper, and rag stock. Pabco Products, Inc., Emeryville, Calif., has combined radiant gas burners with previously used steam drying rollers to boost production by 15 to 20%.



INSTALLED ON FIRST DRUM ONLY, gas burners remove much of the water content and heat paper web to steam drying temperature fast.

Here's the system

Ingredients for the paper backing product are put through pulpers and beaters. Then the paper is formed on a cylindrical screen. Suction boxes remove water from the paper as it is formed into a sheet. More water is removed as the material passes through two pressing stages. Then the sheet is fed to steam heated drying drums.

When first approaching the problem of increasing production on this operation, Pabco engineers investigated the cost of adding steam drums to the process. Initial cost was considered too high. Extra space requirements for additional steam drums was great also.

Consideration was then given to the installation of radiant gas burners, which was found to be a more economical means of decreasing drying time in the process. The burners were needed only on the first set of drums the web of paper backing passes over. Cost of fuel for operating the Red-Ray radiant gas burners installed is low and no additional labor is required to operate them.

Drying starts sooner

Intense heat applied directly to the outer surface of the material where evaporation actually takes place is utilized in the process of evaporation and the surface temperature remains below the boiling point. Because the radiant burners remove a considerable amount of water by evaporation and heat the web to approximately steaming temperature, the drying starts immediately upon the web's contact with subsequent steam drums.

Automatic and interlocked controls on the process are arranged to shut the entire process down if failure of any part occurs. Flame rods on the pilot lights, air, and gas pressure switches wired in series with the main gas valve to shut burners off in the event of air or gas supply failure, a centrifugal speed switch which operates if the machine slows down below a safe minimum speed, and a photo electric switch, which shuts gas off immediately if a break in the paper web is detected, are other safety features of this installation.

Batteries re-used 4 times

RESTORING BATTERIES to service offset cost of charger in 45 days.

Two-hour charging job leaves flashlight cells in like-new condition at Northrop.

FLASHLIGHT batteries—previously used and discarded at a rate of about 13,000 per month—are providing 400% more service for Northrop Aircraft, Inc., Hawthorne, Calif. Breathing this added life into the cells and cutting costs substantially is a compact bench-size charger.

Prior to being placed in the charger, batteries are checked for their ability to take a charge. Only 2% of the cells fail the test and are discarded. When fully loaded the charger takes 184 batteries and requires 2 hr. to rejuvenate them.

Up to the third charging, battery life is reportedly restored to a "like new" condition. After the third charging, battery efficiency is reduced considerably and the cells are discarded after four charges.

Initial cost of the charger, which was manufactured for Northrop by Majors Aircraft Engineering Co., Hawthorne, Calif., was offset through battery cost savings in 45 days of operation.

REAL HEADACHES could result from furnace repair jobs like this one at Gardner-Denver's Colorado heat treating plant, but smart planning and scheduling have turned them into smoothly handled repair work.

Maintenance without turmoil

Latest methods at Western heat treating plants illustrate best ways to meet special equipment care problems almost every plant has.

"PREVENTIVE" is the key word in describing the latest maintenance procedures and methods at Western heat treating plants. Repairs are now planned and handled smoothly without "shop turmoil" or extensive lost production.

How it's being done supplies some good lessons for maintenance men in all types of Western plants, simply because successful heat treating equipment maintenance requires solutions to special types of problems almost every plant has.

Many talents needed

For example, heat treating maintenance requires the talents of men in many different trades—masons, welders, machinists, pipefitters, tinsmiths, electricians, oilers, and laborers. It requires special understanding and care of equipment operating at high temperatures, and under special conditions of corrosion too. Heat treating plants have wrestled with a relatively new problem in maintenance of gas tight seals at high temperature. As in many other industires, maintenance is becoming an upgraded function because of the operating precision required of equipment as demands increase for narrower limits in product quality.

How the heat treating industry is supplying smart answers to everyday equipment care problems is well exemplified by the progressive program at Gardner-Denver Co. in Denver.

AUTHOR OF THIS ARTICLE

F. R. ANDERSON
Chief Metallurgist
Gardner-Denver Co.
Denver, Colo.

Furnace fan maintenance

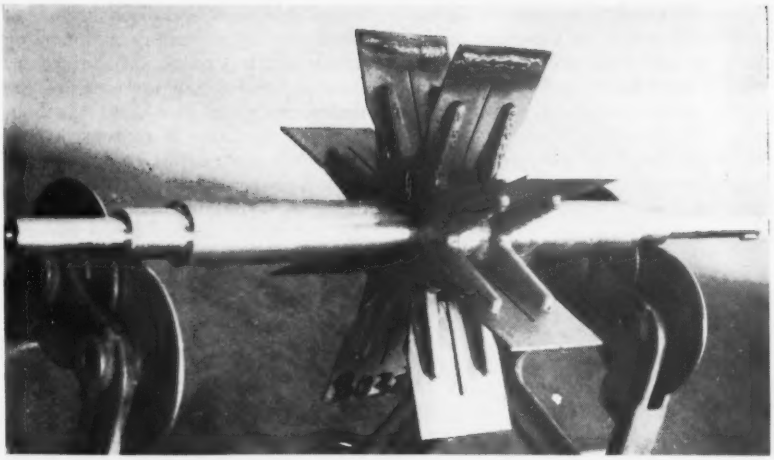
Use of fans in furnaces is not new; among the first were those used in drawing furnaces in 1925, restricted to top temperatures of 600 deg. F. After the value of such fans was proved for promoting temperature uniformity, it was only a matter of time for their application to furnaces oper-

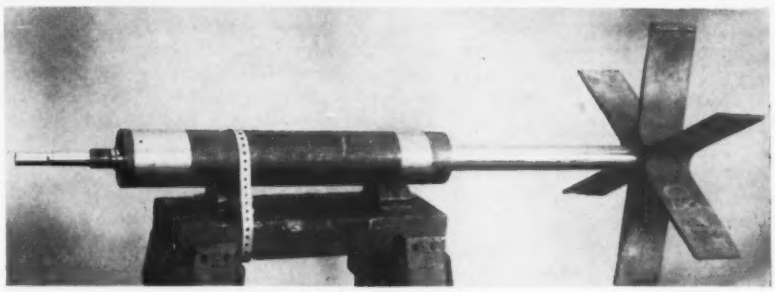
ating at temperatures up to 1,800 deg. F.

In the past 15 yr. fans have been used for the dual purpose of promoting atmosphere uniformity as well as temperature uniformity, particularly in gas carburizing furnaces. As temperatures increased, maintenance problems and operating conditions necessary to satisfactory performance became more serious.

One of the early rules, and still a good one, was that fan rotation must be continuous at temperatures above some 800 deg. F. to avoid sagging under static load. In some of the more modern furnaces, fan shafts are designed to have cooling water circulating through them to prevent heating and distortion in operation. Some designs, however, cannot incorporate such a feature and a smooth running fan depends on good operating and maintenance procedures.

An out-of-balance fan is readily evident by the vibration it sets up within the furnace assembly. It is usually a condition which is barely perceptible in its early stages and gradually becomes more severe until complete failure may occur. Long before this state is reached, the damage to other parts of the assembly may assume serious proportions. One of the more susceptible components of furnace assemblies is the refractory and insulating lining which can be badly cracked and crumbled by vibration set up by an off-balance fan. Other mechanical damage can also result. So it becomes important to detect and make early repair of rough running fans.





TWO METHODS FOR FAN-SHAFT BALANCING are in use at Gardner-Denver. Shown at top is a method involving the use of two simple balancing rolls for support of fan-shaft assemblies with the fan located between shaft ends. Second method (bottom) is to use a tube housing two ball bearing assemblies which provide support identical to those in furnace assemblies. In either case the "heavy" side of the unit revolves downward. Fan blades are bent or weld is applied to the blades on the "light" side of the unit to restore balance.

Why fans are unbalanced

An off-balance condition usually results from loss of a piece of a fan blade by hot cracking and ultimate fracture or erosion around a defect in the casting or weld. Sometimes it results from bending of the shaft by sagging or because a foreign particle has found its way into the rotating blades. Once an out-of-balance condition develops, continued operation serves only to make it worse and the only damage-preventive action is a shut-down and restoration of balance by suitable repair.

Actually, repair is relatively simple because all such fans are designed in a symmetrical form about an axis of rotation so that static balancing is all that is necessary.

There are two suitable methods for supporting fan-shaft assemblies so that an out-of-balance condition can be detected and corrected. In one, a tube houses two ball-bearing assemblies which fit the two bearing diameters of the shaft so their support will be identical to those in the furnace assembly. This is important.

The test assembly is placed in a horizontal position which allows the "heavy" side of the fan to drop by free rotation to the bottom point. Several trials by slow, free spinning will reveal the "heavy" side. At the same time, shaft rotation can be checked against a stationary reference point or a dial indicator to determine if it is bent. A bent shaft can be straightened by supporting it on each side of the bend and applying pressure at a midpoint in a direction which will restore straightness. Several pressure applications and subsequent straightness checks may be necessary to restore concentric rotation.

Once the shaft is straightened, other free rotation tests should be made to determine if the unit is still out of balance. If it is, balance correction can be obtained by welding metal on the tip of the top or light blade. Another method is by removal of metal from the "heavy" or bottom blade by drilling, milling, or filing. The welding method is quickest. It should be pointed out that the weld deposit should be of heat resistant material, comparable to the blade material. Several applications of weld metal or removal by machining may be necessary before free rotation will fail to indicate tendency to a "heavy" side.

Testing center-mounted fans

The other test method involves the use of a set of simple balancing rolls for supporting a fan-shaft assembly where the fan is located between the ends of the shaft. In either case, sensitivity of the test depends on the use of low friction bearings. Dynamic balancing at the operational speed of the fan has been used a number of times but in no case has it been found necessary in order to obtain satisfactory balance.

In cases where fan shaft straighten-

ing is necessary, it is best to confine cold straightening to a portion of the shaft which does not reach stress relief temperatures during operation. In case cold straightening is affected by subsequent heating, re-straightening at or above the stress relief temperature may be necessary in order that trapped stresses will not later operate to cause a bent condition.

Fan bearings important

Another factor in a smoothly operating fan is the type and condition of the bearings on which it spins. Lubrication by use of recommended lubricant in proper amount is the first requisite. Another, but perhaps less obvious factor, is to make sure replacement bearings are the type recommended by the furnace manufacturer. Sometimes, standard bearings do not have the characteristics necessary to long and satisfactory operation. Allowance must sometimes be made for growth of the shaft as it heats, particularly where the fan is mounted between the bearing supports. In such cases the bearing must be free to slide, otherwise it will bend, seize, fail, and set up a serious vibration. The steady, smooth hum of a true running fan is music to the ears of furnace operators and maintenance men.

Refractory repairs planned

In all furnace assemblies, heating and cooling cycles are the cause for expansion and contraction of the refractory, whether it is ceramic or heat resisting metal. Non-uniformity of heating or cooling of attached or adjacent portions of the assembly leads to introduction of stresses which may be reflected in buckling, cracking, or breakage. Restraint by use of heavier members or anchorage to a rigid frame serves only to make matters worse.

These facts have long been recognized by furnace designers and modern furnaces embody designs which minimize the harmful effects of non-uniform growth and shrinkage. While these effects can be reduced, they cannot be completely eliminated except by continuous operation at a set temperature. The steel mill blast furnace is an example of such operation where years may elapse between shutdowns and when they occur a major rebuilding job is necessary. For this reason alone, it is good practice to limit shutdowns as much as possible to maintain a uniform operating temperature level. In batch type furnaces, however, the repeated loading of cold work and discharge of hot work sets up a heating and cooling action which is reflected in refractory damage, accounting for much of the maintenance cost in a heat treat shop.

While the laws of thermal expansion and contraction cannot be repealed, they can be recognized to the extent that repair practices embody the design refinements of the original equipment. Insofar as possible, movement from thermal effects should be unrestrained; allowance should be made for growth. Heating and cooling should be slowly and uniformly done so that localized buckling or shrinkage will be held to a minimum.

Study heating-cooling patterns

In spite of good design, continuous operation, and careful use, refractory failures will eventually occur which will require repair, the success of which will depend on enlightened maintenance practices. A study of heating and cooling patterns, effects of light and heavy masses in heating, and restraints to growth and shrinkage will often point the way to a simple solution of a vexing problem.

One such case was a troublesome problem of interference between a fan shaft and the bore in the neck of a deflector casting through which it projected into the top of a vertical retort carburizer. The fan and shaft to which it was attached, together with the deflector as a part of the cover assembly, were subjected to wide heating and cooling cycles each time the furnace was loaded and unloaded. Clearance between the fan shaft and neck of the deflector was small in order to minimize the effect of carburizing gases and heat on the seal and bearing.

Find the cause; repair is easy

The deflector casting was a flat bell with a flange shape extending beyond and over the fan blades. Because of its shape, each cooling cycle caused initial shrinkage of the outer rim due to its more rapid cooling which exerted a compressive force against the still hot and plastic hub. For a long time, interference between the fan shaft and deflector bore was blamed on bending of the shaft or whipping of the shaft during rotation, both effects being ascribed to inadequate design. Finally, it was discovered the bore was progressively shrinking with each cooling cycle and the point was eventually reached where clearance no longer existed.

Discovery of cause led to the simple solution of reaming the deflector bore to re-establish the necessary clearance. Here was the effect of non-uniform heating and cooling to cause mechanical distortion. Other progressions from this simple case are cracking and finally gross breakage. Good maintenance of heat resisting metal assemblies first involves a recognition of the basic laws of expansion and contraction caused by heating and cooling. Much expense and lost production can be avoided by their recognition. Certainly the tools for doing the job, machines, presses, welding equipment, heat resistant alloys, fine ceramic refractories, and special welding rods, are available to all facing such problems; it remains only for them to be used in an intelligent manner.

Instrument man inspects

The job of the instrument man in Western heat treating shops has become more involved as new temperature and atmosphere controls of bewildering complexity are designed to take over the control once exercised by the skilled heat treater. This is a very special phase of heat treating equipment maintenance and requires special attention, but for the sake of this article, it is obvious that its proper handling requires a specially trained man pursuing a well established schedule of checking, inspection and repair. He can be a key to the entire maintenance set-up in that his periodic observations disclose conditions which will need attention before they progress from "conditions" to "headaches."

He is in an excellent position to note conditions of refractory wear, breakage or slagging, leakage of valves and piping, distortion or breakage of retorts, poorly lubricated bearings, or out-of-balance fans. Early recognition of such troubles can forestall expensive emergency shut-downs and scrapped work—the headache period.

Act on operator suggestions

Observations by the instrument man and supervisor should be augmented by operators of the equipment reporting conditions requiring attention. Operators best efforts in this respect can be enlisted and held by letting them know their help is utilized. This can be done best by acting on their suggestions as soon as possible or explaining the reason for delay or lack of action to them. Maintenance under these conditions can be a planned program instead of a stop-gap affair.

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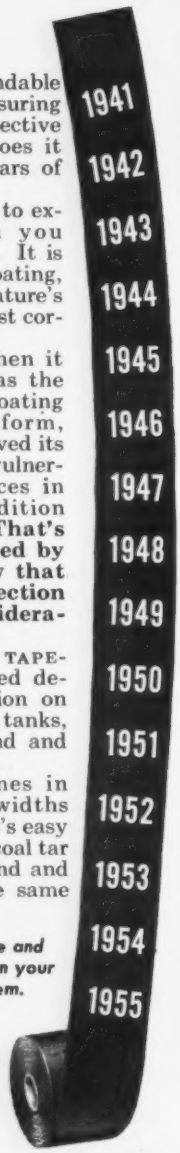

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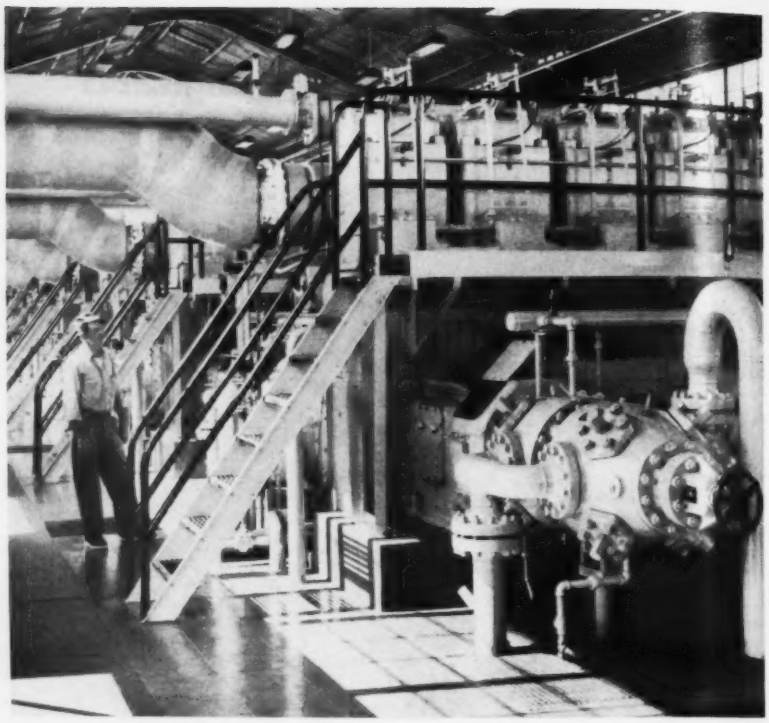


DOUBLE-DUTY RECORDS ARE THE KEY to efficient maintenance of these two-cycle semi-high compression units at the Blythe station of Southern California Gas Co. Check sheets control overhaul scheduling, then double as permanent office records. Operating men are trained to do double duty too, so no special maintenance crews are required. It all adds up to . . .

New approaches to compressor upkeep

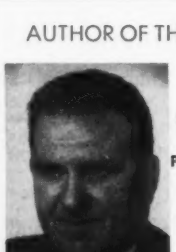
REVISION of frequency of overhauls and individual treatment of compressor units became necessary at the Southern Counties Gas Co., Blythe, Calif., with the advent of high compression ratios, supercharging, and the acceptance by the natural gas transmission industry of higher speed units.

The seven units installed at the Blythe compressor station in 1948 were of the two-cycle, semi-high compression type, of which there were very few in operation at that time. A maintenance program was set up with a complete set of records to be used as a guide in future overhaul scheduling.

Additions since 1948 have been eight high-compression units—two in 1949, one in 1950, two in 1953, and three in 1954, making a total of 15 compressor units in the plant.

At Desert Center and Cactus City, Calif., we have gas turbine driven centrifugal compressors. Each of these stations is a single unit station. The gas turbines are General Electric 5,700

AUTHOR OF THIS ARTICLE



GLENN V. VAIL
formerly Plant Superintendent, Blythe Compressor Station, Southern California Gas Co., Blythe, Calif.

Mr. Vail recently resigned his position with Southern California Gas to join Pacific Northwest Pipeline Corp.

IN ANY engine maintenance program, there are a number of operations and tests that can be set up as a part of the routine operational procedures for the engines. Typical practices, which could be classed as preventive and which would appreciably diminish downtime and maintenance cost, are:

1. A reasonable warm-up period before applying load.

2. Idling for a few minutes before shutdown to minimize carbon formation.

3. Frequent horsepower checks to avoid overload.

4. Vigilant attention to pyrometer readings.

5. Insistence that design speed be maintained to prevent operation at slower speeds under conditions which would be overload at rated speeds.

hp., regenerative cycle, two-shaft units, and the centrifugal compressors are single-stage DeLaval equipment.

Why operators do maintenance

The original program at the Blythe station was started assuming that the units should be inspected once a year, or every 7,000 hours of operation, with these inspections scheduled during that part of the year when the horsepower requirements of the plant were lowest.

It was decided that when a unit was taken out of service for routine inspection and overhaul, the work should progress 24 hours a day, seven days a week until completed.

It was essential that all of the operating personnel be trained in the maintenance and overhaul of the engines, and that a maintenance crew, as such, would not be required. This decision was influenced somewhat by the idea that an operator who thoroughly understood and assisted with the maintenance of the units would be a better operator and would be more interested in preventive maintenance.

New checklist controls all the way

To initiate this program, a check sheet was prepared listing 33 items. Then a set of sheets based on each of

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(Above) A Pascoe field crew applies roofing to lightweight structural sections, roll formed for Pascoe by Caine Steel Co. of California.

(Below) This typical Pascoe building reflects the versatile, postwar thinking of Pascoe engineers, whose modern production techniques, both in the rolling and fabrication of structural sections, produce sounder buildings faster.

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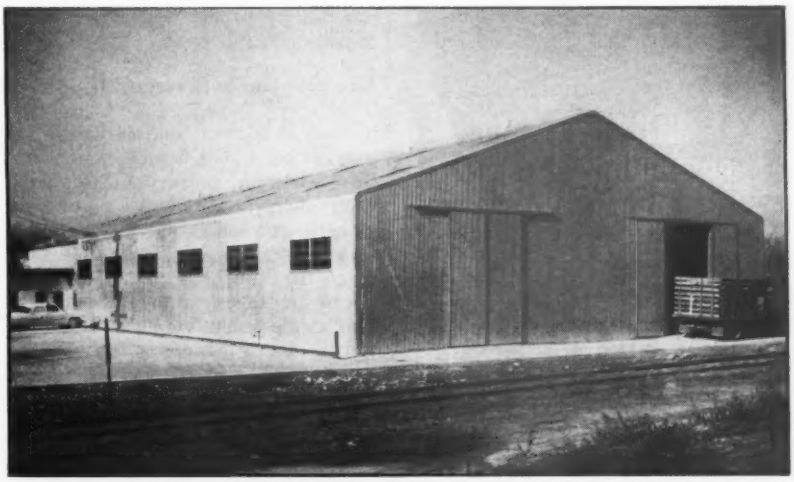
Pascoe's structural shapes are roll formed to exact lengths, and delivered on rigid schedules by Caine Steel Co. of California. These shapes are lightweight yet enjoy an excellent strength-weight ratio, and being roll formed, they are more accurate and economical than identical shapes formed by any other process.

If you have a building problem, investigate the time and money saving advantages of Caine roll formed shapes. Caine Steel roll forming facilities and steel inventory are among the largest in the West.



For complete information and engineering data on roll formed shapes for structural or other building uses, write: Caine Steel Co. of California, 2451 East 23rd Street, Los Angeles, or call LUdlow 8-1211

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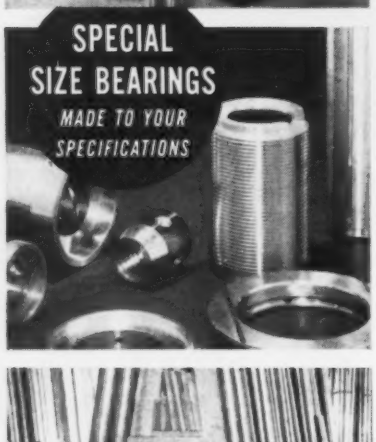

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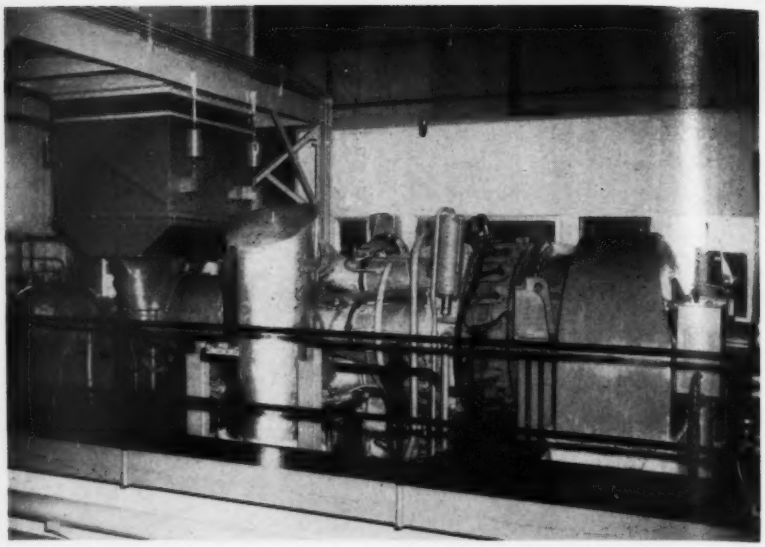

GAS TURBINES driving compressors at Cactus City station are General Electric 5,700-hp., regenerative cycle, 2-shaft type. Compressors, not shown in photo, are single stage, centrifugal, DeLaval equipment.

the 33 items was sent into the field. These sheets provided either boxes or equipment sketches with critical measurement points on which are recorded the results of inspection, replacement, clearances, etc.

These field copies are then returned to the office for analysis and transcription to permanent records to be used for future reference. To assure that the proper maintenance methods were used, job breakdowns were made for the more critical operations.

The items on the check sheet are listed in the order in which they should be performed to avoid overlapping and interference. The sequence provides that initial disassembly include all equipment which might require machine work.

Coordination between shifts

Each shift then continues with the current job rather than start another. Thus, the program serves to acquaint each employee with the various jobs rather than produce specialists in certain items. This, of course, does not mean that two consecutive jobs cannot be progressing at the same time so long as the general sequence is not interrupted and manpower is available.

All minor maintenance work performed between regular inspection periods is recorded in the maintenance log book, which has separate sections for each unit.

Between routine inspections, other preventive maintenance and operational checks are made on the units. The power cylinder compression and firing pressures are recorded, and the units balanced each month. The overspeed trip, low oil pressure switch, and high water temperature cutout are checked every three months.

The magneto points and spark plugs are checked every 2,000 hours of operation. The crankcase and lubricator oil usage is reviewed monthly, and when out of line is investigated. The scavenging air and crankcase pressures are checked and recorded weekly.

Special tools save time

Special time and labor saving tools are used in our maintenance program wherever possible. Of these, impact wrenches are used in disassembly only. Air hoists are provided in all the engine rooms.

A portable platform is mounted over the compressor cylinders during the overhaul periods for the storage of the power cylinder heads and upper gear. Jigs are provided for operations such as fitting compressor and scavenging rod packings, bearing liners, etc. Torque wrenches are used in the reassembly of the more critical parts, such as the power cylinder heads and the bearings, to get a more uniform stress on all the bolts.

Other special tools have been developed for the handling, disassembly, and reassembly of various engine parts. These special tools were developed either directly by the plant people or through the interchange of informa-

tion and ideas with other companies with similar equipment.

This maintenance program, and the records kept, are now beginning to bear fruit. The necessity for calling a crew out for emergency engine maintenance has been eliminated, and a review of the engine maintenance log book for the first nine months of last year, for example, shows that major maintenance between inspection periods has been nil.

Overhaul frequency determined

The overhaul frequency for the semi-high compression units has been fairly well established, and the intervals for the inspection of the high compression units are taking shape. Maintenance experience to date indicates that the semi-high compression units should receive a major overhaul at about 10,000 hours, and the high compression units should be overhauled at approximately 15,000 hours.

Minor maintenance might be required between these overhauls, such as rod packing adjustments, fuel injection and air starting check valve reconditioning, and compressor crosshead float adjustments.

The time required for a major overhaul is about 600 manhours. This varies with the number of adjustments and replacements required; the overall time being seven to ten days.

The difference in the time between overhaul periods for the two types of engines was brought about by the higher compression ratio, improved design of the power pistons and the power cylinders, larger crankshaft with precision bearings, and larger scavenging cylinders on the high compression units.

It is anticipated that the maintenance on the gas turbines will be very nearly the same as would be expected with large steam turbines. The maintenance program for these units is set up for major inspections every 25,000 hours of operation, with a minor inspection scheduled between each major.

IF YOU NEED UP-TO-DATE TECHNICAL INFORMATION . . .

On electric motors—see page 65 of this issue for a listing of the 50 best manuals in print today, and available to you free.

On abrasives, see page 52 of the February issue for listing of best available manuals.

On industrial fasteners, see page 84 of the January issue. There's still time to obtain manuals listed there.

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Originators not Imitators

"Every kind of imitation speaks the person that imitates as inferior to him whom he imitates, as the copy is to the original."

LORD SOUTH

R. D. WASSERMAN

In every age, in welding and every other industry, you will always find those whose only claim to fame for their product is that it is "just as good."

More than 50 years ago, J. P. H. Wasserman, a Swiss metallurgist, pioneered a new welding process. He blazed a trail that others have tried to follow. Relentless research following his discovery has perfected Eutectic's "Low Heat Input" metal joining process which provides the high strengths of fusion welding using the lower heats associated with brazing.

Eutectic's research has never been equalled. Very simply, that is why no welding material imitating Eutectic "Low Temperature Welding Alloys"® can be "just as good" or produce equal results and savings.

Year after year, "Eutectic" has originated new and ever better welding alloys to make the weldor's job easier and more profitable. The rapidly increasing preference for Eutectic "Low Temperature Welding Alloys" in over 87,000 American industries is proof of Eutectic's leadership. It is testimony that the American weldor is too smart to be fooled by imitations. The American weldor realizes the importance of getting all the advantages of Eutectic's "Low Heat Input" metal joining process—the elimination or minimization of overheating, warping, distortion, embrittlement and other dangers to base metals.

To the weldor, Eutectic's process means "Better, Faster, Cheaper" welding. To industry everywhere, "Eutectic" has made welding more profitable, with an ever-widening field of application for production, maintenance, and salvage of metals and metal products.

A FEW "EUTECTIC" FIRSTS
1940-1955

- U.S. Patent #2,583,163. Surface alloying process for bending metals.
- U.S. Patent #2,288,869. First Torch Alloy for joining cast iron with color match, without fusion.
- U. S. Patents #2,359,813, #2,410,850, #2,544,000. First metallic film coating to enhance Surface Alloying.
- U. S. Patents #2,279,282, #2,279,283, #2,279,284. First nickel bearing copper alloy for high tensile joining.
- U.S. Patent #2,481,053. First torch alloy and flux for joining high aluminum content metals.
- U.S. Patent #2,471,803. First "Low Amp" coating for metal arc welding of cast iron.
- U.S. Patent #2,632,000. First low-melting electrode for high tensile strength joining of aluminum.
- U.S. Patent #2,632,635. First "Low Amp" electrode coating for high alloy steels.
- U.S. Patent #2,626,339. First electrode for high tensile strength joining of copper.

RESEARCH—BACKBONE OF PROGRESS

During the past 50 years Eutectic Welding Alloys Corporation has learned much. It is possible for imitators to analyze our welding rods, electrodes and fluxes. But originating and producing them is an achievement only "Eutectic" can claim. Only the long, hard road of doing it can provide the answers.

The time spent in imitation is lost, for long before a "copy" can be made, Eutectic's research has perfected other new and improved materials.

Today, in Eutectic's own research centers throughout the world, teams of metal experts create and test newer and better products for metal joining. And, in its own up-to-the-minute plants, meeting rigid standards of quality, "Eutectic" turns these research products into "Low Temp" EutecRods and "Low Amp" EutecTrodes that bring the benefits of "Low Heat Input" metal joining into shops everywhere.

ORIGINATORS NOT IMITATORS

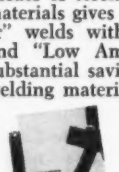
The research behind this phrase is your assurance of the most modern welding materials known. It is your assurance that you are applying advanced "Low Heat Input" metal joining techniques to your critical work and that you have the most modern developments at your fingertips.

Don't be fooled by those who tell you that any ordinary rod or electrode is "just as good." Nothing can match Eutectic "Low Temperature Welding Alloys" performance.

Remember, it is the quality of the finished job and the ease and speed with which you do it that determines real economy, and not a few pennies difference in original cost. Because of its research facilities, only Eutectic Welding Alloys Corporation gives you true "Low Heat Input" metal joining and helps you eliminate the risks of dangerous overheat overheating and the subsequent distortion and damage to base metals. And that, after all, is what you are always after.

READY TO PROVE WHAT WE SAY

To bring you all the benefits of Eutectic's research, our District Engineers are ready to go right into your shop to show you how Eutectic "Low Temperature Welding Alloys" will solve your welding problems. Your Eutectic District Engineer will show you how the same electrode holder or torch you use with conventional materials gives you "Better, Faster, Cheaper" welds with "Low Temp" EutecRods and "Low Amp" EutecTrodes . . . with substantial savings in work, time, gas and welding materials.



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50 ELECTRIC MOTOR MANUALS — yours for the asking

Here are reviews of the best available manuals covering a-c and d-c integral electric motors. Obtain your selection by circling item numbers on rip-out postcard, page 67.

NOW, with the recent changes in NEMA standards and ratings, fast-moving trends in electric motor design, and the increased importance that automated production has placed upon the performance of a-c and d-c electric motors, is the time for you to refresh your knowledge in this field.

Know-how that will enable you to pick the right electric motor to do any particular job, data explaining how to use the motors you choose, and information on keeping motors humming —it's all contained in the technical manuals reviewed below. Offered as a special service to WESTERN INDUSTRY readers, these reviews cover the 50 best manuals in print today.

You are invited to check these reviews and select those manuals that promise to be most helpful in solving your electric motor problems. Circle the appropriate key numbers on this month's Reader Service Postcard (page 67), and we will be glad to see that you obtain your selection promptly and without obligation.

How to select a-c motors

Selection data for a-c motors from 1 to 200 hp. is given in four tables including speed-frequency relationship, domestic power supply characteristics, current and torque values, and breakaway torque. Dimension charts and information on nine motors are included, along with a complete price list. (Bulletin B-2103) *Reliance Electric & Engineering Co.*

. . . for your copy circle No. 150

Specs and 20 large photos of new motors

A two-color bulletin, "The New L.A. Line of Electric Motors," contains more than 20 large photographs, including cut-away views, and 10 explanatory technical drawings and graphs, and information on performance and application features of new open drip-proof, as well as enclosed and explosion-proof, electric motors which meet new NEMA specifications. (Bulletin No. 1700) *Louis Allis Co.*

. . . for your copy circle No. 151

116-page Westinghouse "Quick Selector" manual

First section of the Westinghouse Industrial Apparatus Quick Selector is a guide to motors. It includes application data, dimensions, weight, identifying characteristics, and prices in chart form for all Westinghouse industrial a-c motors. Other sections cover controls, safety switches, circuit breakers, load panels, ducts, etc. *Westinghouse Electric Corp.*

. . . for your copy circle No. 152

12-page manual on new G-E industrial d-c motors

The d-c Kinamatic, General Electric's new industrial 1 to 150-hp. motor, is the subject of a 12-page four-color booklet. Included are design feature, speed, and motor maintenance sections, and dimensions and rating charts. The booklet (GEA-6355) has 15 pictures and diagrams. A second leaflet (GEC-1372) treats industrial drip-proof d-c motors from ½ to 150 hp., including information on enclosure, frame, bearings and lubrication, rigging, ventilation, etc. Includes charts, photos, and diagrams. *General Electric Co.*

. . . for your copy circle No. 153

For complete data on U. S. motors . . .

This eight-page bulletin illustrates and describes U. S. Electrical Motors' entire line. Fifteen fact manuals on different U. S. motors are listed and illustrated on back cover, and are available upon request. All booklets are illustrated in four-color with pictures, drawings, and charts. (Bulletin F-1878) *U. S. Electrical Motors, Inc.*

. . . for your copy circle No. 154

56-page motor and generator reference book

This book was designed to assist in the selection of motors for industrial applications. It is divided into sections, including a general discussion of motors, induction and synchronous motors, d-c motors, and adjustable speed control. Well illustrated with pictures, tables, and diagrams. (Bulletin 51R7933B) *Allis-Chalmers Mfg. Co.*

. . . for your copy circle No. 155

12-pages of data on electric power drives

A 12-page booklet devotes four pages to the engineering features and advantages of the Sterling Speed-trol electric power drives (200 types are available), and another four pages to the construction and operation of the Slo-speed power drives. Final section covers totally-enclosed fan-cooled and totally-enclosed non-ventilated motors, along with drip-proof units. (Bulletin 182A) *Sterling Electric Motors.*

. . . for your copy circle No. 156

Specifications for single- and polyphase motors

An eight-page, two-color booklet treats split phase, capacitor, and repulsion start induction single phase motors, and squirrel cage induction, synchronous, wound rotor, and shunt compound polyphase motors. Specifications for both are detailed, with information on enclosures and mountings included. Various motors treated range from 1/3 to 3,500 hp. *Century Electric Co.*

. . . for your copy circle No. 157

Data book on Wagner polyphase motors

Complete construction features along with frame sizes and dimensions for drip-proof polyphase motors with 1- to 30- hp. ratings are given in a well-illustrated brochure. A second booklet contains information on totally enclosed standard and explosion-proof polyphase motors in corrosion-resistant cast iron frames rated up to 250 hp. (Bulletins MU-202, 203) *Wagner Electric Corp.*

. . . for your copy circle No. 158

49-page electrical machinery catechism

"Catechism of Electrical Machinery" presents in a clear manner important theoretical and practical features of the common types of a-c and d-c motors. Illustrated with pictures and diagrams, the 49-page book presents material in question and answer form. The first section deals with electricity and magnetism as utilized in electric motors; other sections relate to d-c motors, a-c machinery, and questions relating to all classes of electrical machinery. (Bulletin AEB 100.5L) *Fairbanks, Morse & Co.*

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Complete A. O. Smith line detailed

An eight-page booklet (EM 157) details this line of ¼- to 5-hp. single phase and 1/3- to 150-hp. polyphase motors, including horizontal, vertical, solid shaft, vertical hollow shaft, close-coupled pump, horizontal "C" flange, and gearmotor types. Photographs, charts, and diagrams are included. Separate manual details the vertical hollow shaft motor from 1 to 150 hp. for vertical turbine pumps, while polyphase horizontal motors are the subject of a third booklet. Multi-color four-page leaflet (EM 156) details construction of single- and polyphase integral motors from 1 to 10 hp. *A. O. Smith Corp.*

. . . for your copy circle No. 160

82 pages of selection and buying information

General Electric has two catalogs (GEC-1026 and GEC-1015B) with 82 pages of complete information on selecting and buying motors. Included are details on fractional- and integral-horsepower units, single- and polyphase, squirrel cage, and induction motors. (Bulletins GEC-1015B, 1026) *General Electric Co.*

. . . for your copy circle No. 161

Reference library on 900 special motors

Designed for easy reference, this card library on more than 900 motors of every size and shape contains a photograph of each motor with accompanying information designed to save motor purchasers the unnecessary expense and delay of special-motor development. All motors included have been field-tested and proved practical. *Reuland Electric Co.*

. . . for your copy circle No. 162

16-page booklet on entire motor line

Electro Dynamic has covered briefly the construction features and advantages of its entire line of motors in a 16-page booklet. Individual and more detailed booklets cover the company's Series 75 motors, which includes drip-proof, splash-proof, totally enclosed, explosion-proof, and chemical-type units; heavy-duty polyphase units, the all-electric adjustable speed drive, and electronic variable speed drives. (Bulletins 50, 75, 300, 1000, 1100). *Electro Dynamic Division, General Dynamics Corp.*

. . . for your copy circle No. 163

Booklet on new Howell Series 100 motors

Howell Motor's new Series 100 totally enclosed fan-cooled and open drip-proof motors are treated in a 16-page booklet, which contains a large cut-away picture of each type of motor and points out design features. Also included are sections on the cooling system, bearing construction, lubrication, and rotor and stator design. Horsepower range: ½ to 40 for drip-proof; ½ to 30 for fan-cooled. A second booklet gives information on polyphase motors from 1/6 to 500 hp. and single phase capacitor motors from 1/6 to 5 hp., along with data on enclosures and mountings. *Howell Electric Motors Co.*

. . . for your copy circle No. 164

Totally-enclosed, fan-cooled units

These three leaflets have photographs, charts, and drawings to illustrate industrial motors. Included are details on the single-phase 1 to 7½ hp., d-c 1 to 7½ hp., polyphase 1 to 200 hp., totally-enclosed, fan-cooled 1 to 40 hp., and explosion-proof 1 to 40 hp. units. (Bulletins 400, 500, 505) *Robbins & Myers, Inc.*

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Torque and special design motors

Characteristics, applications, and functions of torque and special design motors are listed in this two-color booklet, which contains pictures of eight different motors and a data sheet to help the company meet your requirements. *B. A. Wesche Electric Co.*

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Polyphase ball-bearing protected units

Two leaflets listing the advantages of ball-bearing protected motors also give information on the enclosed air-cooled and protected-type squirrel-cage polyphase motors. Both are illustrated. Power range: ½ to 60 hp. *Valley Electric Corp.*

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Picture bulletin on single and polyphase motors

An 8-page bulletin gives detailed information with accompanying pictures on single-phase general and definite-purpose motors, and polyphase industrial motors. Contains 31 illustrations, including cut-away views. *Delco Products Division, General Motors Corp.*

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Motors, parts, and mountings

Pump, brake, power tool, hoist, and fan motors are treated in a four-page brochure, along with special mountings and motor parts for built-in drives. Construction advantages of the 1/30 to 5 hp. motors are listed. (Bulletin 100) *Doerr Electric Corp.*

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15	40	65	90	115	135	155	175	195	215	235	255	275	295	315	335
16	41	66	91	116	136	156	176	196	216	236	256	276	296	316	336
17	42	67	92	117	137	157	177	197	217	237	257	277	297	317	337
18	43	68	93	118	138	158	178	198	218	238	258	278	298	318	338
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Master motor specs, performance and application data

Entire line of Master Electric motors is covered in this manual which binds together brochures, data sheets, and price listings for synchronous, slip ring, d-c, squirrel cage induction, repulsion induction, and capacitor electric motors. Power ratings range from ⅛ to 400 hp. Such data as mountings available, frequency of operation, accuracy of stopping, types of construction, special applications, maintenance procedures, and dimensions are discussed. Also included are data on drive units such as gear-motors and fluid drives. *Master Electric Co.*

. . . for your copy circle No. 170

Design and construction of rapid reversing motors

Open drip-proof, totally-enclosed, and blower-cooled reversing motors are treated in a four-page leaflet on rapid reversing motors from 85 to 200 idle reversals per minute. Illustrated with pictures and diagrams, the leaflet includes data on stators, insulation, blowers, and rotor construction, along with a section on multi-speed reversing motors, a dimensions chart, and specifications. *Louis Allis Co.*

. . . for your copy circle No. 171

12-pages of data on Reliance Super T line

The Reliance Super T Line d-c motor is discussed in terms of speed, rate of acceleration, and regulation. Component parts—brush rigging, bearing mountings, insulation, field coils, conduit box—are thoroughly detailed and illustrated. Dimensions and selection data charts for 7½ through 250-hp. motors are included. *Reliance Electric & Engineering Co.*

. . . for your copy circle No. 172

Noiseless deep well pump motors

Design features and application data on the Franklin noiseless suspension are given in this illustrated leaflet, which shows how the suspension prevents noise transmission through pipes in submerged pump installations. This outlines one of many special motors manufactured by this firm. *Franklin Electric Co., Inc.*

. . . for your copy circle No. 173

Imperial squirrel cage armored motors

Construction of polyphase squirrel cage armored motors, 1 to 200 hp., is explained in Imperial Electric's leaflet S-47. Illustrated with seven pictures, including cut-aways. *Imperial Electric Co.*

. . . for your copy circle No. 174

Totally-enclosed, single- and polyphase units

Single phase streamcooled repulsion induction motors are the subject of Bulletin 100, a four-page, two-color brochure. Construction of the motors, available in sizes through 7½ hp., is thoroughly illustrated and described. Bulletin 200 is devoted to squirrel-cage polyphase induction motors, and discusses frame, stator, rotor, end plates, ball bearings, and the streamcooling principle. Bulletin 401 discusses Baldor totally-enclosed motors from the standpoint of design, frame, rotor, end plates, and ball bearings, and details the contraflow cooling method. *Baldor Electric Co.*

. . . for your copy circle No. 175

Motors, enclosures, and mountings

Four types of fractional and integral horsepower motors are described in this eight-page booklet. One section is devoted to eight types of enclosures, another to 12 mountings and modifications. Power range: ½ to 30 hp. Booklet concludes with a chart for fractional and integral horsepower frame sizes, both old and new NEMA. *Peerless Electric Co.*

. . . for your copy circle No. 176

Applications, mounting, and mechanical data charts

This eight-page catalog gives a general description of the basic fractional and integral horsepower (1/6 to 5 hp.) Leland motor types. There are charts on electric data and motor applications, and mounting and mechanical data. A special bulletin covers the polyphase, drip-proof line. *Leland Electric Co.*

. . . for your copy circle No. 177

Lima industrial motors

Pictures, curves, charts, and diagrams give a complete picture of two Lima industrial motors, the drip-proof induction motor and the totally-enclosed, fan-cooled unit. Ratings, frame sizes, electrical characteristics, and suggested applications for both motors are given in two bulletins. *Lima Electric Motor Co.*

. . . for your copy circle No. 178

Variable-speed a-c motors

An eight-page booklet introduces Bogue's variable-speed (up to 30/1 range) a-c motor, and lists some 30 typical applications. A thorough discussion of the motor and its controls is included, with charts on motor dimensions and speed ranges. *Bogue Electric Manufacturing Co.*

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prefers the *flexible* health plan

Morris P. Kirk and Son, Inc., a subsidiary of National Lead Company, supplies most of the die cast metal used on the Pacific Coast. The company, formed in 1922 by J. Paul Kirk and his father, handled health problems for its first few employees as they occurred. Today, with hundreds of people in 16 plants, warehouses, and sales branches throughout the 11 western states, Morris P. Kirk and Son, Inc., continues to provide personalized health protection through a specially designed CPS-Blue Shield plan. Your broker or the CPS office in your community has full details. Call today.

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Quick selection and care of electric motors

"Handy Guide for Quick Selection of Electric Motors" is a reference book containing information on general-purpose motors, motor characteristics, electrical modifications, dimensions, and controls. Illustrations, charts, and diagrams are included. "A Guide to Care of Electric Motors" tells you what to do about such motor enemies as dust, stray oil, moisture, friction, misalignment, vibration, uneven wear, etc. *Allis-Chalmers Mfg. Co.*

. . . **for your copy circle No. 180**

Westinghouse wound rotor induction

Complete details on construction, along with advantages and suggested applications for constant or adjustable speed duty of open, drip-proof wound rotor motors from 20 to 500 hp. are given in this eight-page brochure (3200-1). Booklet also includes specifications and a chart on dimensions. *Westinghouse Electric Corp.*

. . . **for your copy circle No. 181**

Packaged adjustable-speed drive

Features of the a-c V*S packaged adjustable-speed drive, which includes the operator's control station, adjustable-speed drive motor, and control unit, are detailed in an eight-page booklet containing pictures and drawings, and speed, horsepower, and torque charts. *Reliance Electric & Engineering Co.*

. . . **for your copy circle No. 182**

Summary of a-c motors by G-E

A 12-page booklet treats 1 to 30-hp. Tri 55 clad a-c motors from the standpoint of application, availability, type of enclosure for your operation, and your drive and mounting requirements. *General Electric Co.*

. . . **for your copy circle No. 183**

Data on component motor parts

A three-color brochure discusses parts and materials used in the manufacturing and assembly of standard, slip-ring, and fluid-shaft (fluid coupling is built into unit) motors and motoreducers, and contains in-use pictures and prices. *Reuland Electric Co.*

. . . **for your copy circle No. 184**

Drip-proof and totally-enclosed power drives

Totally-enclosed, along with splash-proof and drip-proof motors are treated in this two-color leaflet. Design features are illustrated with photographs and drawings. *Sterling Electric Motors*

. . . **for your copy circle No. 185**

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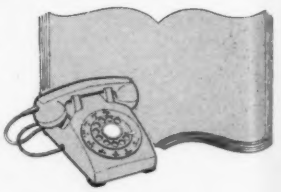

Help people find YOU fast in the **YELLOW PAGES**

Pacific Telephone

. . . *for more details, circle No. 44 on Reader Service Postcard*

Junior may not know it, but he's riding the only "true" bicycle made west of the Mississippi. Something else he wouldn't know is the problem Wheel Craft had with his pedal cranks splitting in the fourth stage of the forming process (above). Here's how they solved this problem.

Your production problems . . . our business, too

Wheel Craft, Inc., is another manufacturer that found United States Steel has the facilities and "know how" to help with production problems. Wheel Craft, a division of Monark Silver King, Inc., had a problem with wire: how to stop crankshaft heads from cracking at the critical flattening stage. The manufacturer asked USS metallurgists to study the problem.

By analyzing the production processes involved and knowing the service requirements of the product, our metallurgists were able to recommend the one right steel that eliminated the problem. Steel made in this way, *for a specific purpose*, is the kind of steel that makes your production lines run smoothly and adds to the quality of your finished product.

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HELPFUL LITERATURE for the West's plant operating executives

FOR YOUR FREE COPIES, circle appropriate key numbers on postcard, page 67

Applications of adhesives, coatings, and sealers

Typical applications for adhesives, coatings, and sealers in the metalworking, transportation, general manufacturing, electrical manufacturing, and building products industries are listed in complete tables in an illustrated 12-page brochure. Tables are designed for easy reference, listing the general type of application, specific examples, characteristics, methods of application, color, base, solvent, solids content, and weight. *Minnesota Mining & Manufacturing Co.*

. . . for your copy circle No. 200

120-page handbook on transformer laminations

Allegheny Ludlum's 120-page transformer laminations handbook gives detailed information and drawings on 100 different standard lamination shapes. Included is information on direction of grain, count and weight of laminations, magnetic and mechanical dimensions, and lamination die layout. *Allegheny Ludlum Steel Corp.*

. . . for your copy circle No. 201

28-page speed reducer handbook

Lufkin's 28-page manual covers four types of gear assemblies for speed increasing and reducing service: single reduction reducers, double reduction reducers, medium-speed single reduction reducers and increasers, and high-speed reducers and speed increasers. Included are tables on horsepower ratings, general dimensions, and overhung load capacities, and information on specifications and selection. *Lufkin Foundry & Machine Co.*

. . . for your copy circle No. 202

Manual on new Link-Belt gearmotors and motogears

A new line of gearmotors and motogears is detailed in this booklet (No. 2447), which includes complete selection and application data along with features of construction, load classifications, dimension tables, overhung load ratings, and mounting assemblies. Designs are in keeping with new NEMA motor sizes which deliver more horsepower per pound. *Link-Belt Co.*

. . . for your copy circle No. 203

How and where to use resistant hydraulic fluid

An eight-page bulletin on Houghto-Safe fire resistant hydraulic fluid contains information on installation and maintenance of the fluid where potential fire hazards exist. Technical data is given on installation as related to packings, strainers, filters, pumps, and other parts of the system. The importance of pumpability at low temperature and storage stability is stressed, and typical uses of the fluid are outlined. *E. F. Houghton & Co.*

. . . for your copy circle No. 204

52-page manual on synthetic fluids and lubricants

Synthetic fluids and lubricants are the subject of a 52-page illustrated book, which covers characteristics, properties, and uses of both standard and special fluids and lubricants in chart and picture form. A section is devoted to selection of the proper lubricant on the basis of viscosity, temperature, solvent effects, and materials of construction. *Carbide & Carbon Chemicals Co.*

. . . for your copy circle No. 205

Performance data on electric fork trucks

Performance data, dimensions, details on controls and construction, and complete information on special features of two new electric fork trucks are given in two bulletins from Baker-Raulang. The two trucks, of 6,000- and 4,000-lb. capacity, are illustrated with photographs and drawings. *Baker-Raulang Co.*

. . . for your copy circle No. 206

72-page manual on industrial fans

The new Series 106 industrial fans for air and materials handling are described in a 72-page illustrated catalog (Bulletin 5306). It covers the features of the new fans, discussing wheels and arrangements, optional construction, modifications, and special design and construction details for high temperature operation. A special section is devoted to the packaged industrial fan, a self-contained unit with fan, motor, and drive unit. Also included are selection data and tables of dimensions and weights. *American Blower Corp.*

. . . for your copy circle No. 207

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HELIARC cutting, a new process developed by LINDE, brings all the desired features of economical high-speed operations to the cutting of aluminum.

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Learn the details of how HELIARC cutting can help you increase production and cut operating costs. Call your LINDE Representative today.

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Mechanically-sealed pumps in capacities from ⅛ to 6 g.p.m. and pressures to 600 p.s.i.

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General purpose pumps in capacities from 2 to 200 g.p.m. and pressures to 100 p.s.i.

MODEL CK
High pressure pumps in capacities from 5 to 200 g.p.m. and pressures to 400 p.s.i.

MODEL M
Coolant pumps with automatic internal by-pass. Capacities from 2 to 50 g.p.m. and pressures to 15 p.s.i.

MODEL R
Automatic reversing pumps in capacities from ¾ to 200 g.p.m. and pressures to 100 p.s.i.

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. . . for more details, circle No. 48

48-page book covers all Jeffrey products

Here, pictured and described, are the mining, materials handling, processing, and conveying equipment manufactured by Jeffrey. Included are chains, sprocket wheels, transmission, elevating and conveying machinery, mechanical and vibrating feeders, crushers, grinders, and many other items. A brief section discusses the research and testing facilities of the company. *Jeffrey Manufacturing Co.*

. . . for your copy circle No. 208

Kit on general purpose industrial wipers

Two Kimwipes, a general-purpose industrial wiper, are included in a sample kit, which also illustrates and describes applications for the wipers and shows the new metal wall dispensers made for them. *Kimberly-Clark Corp.*

. . . for your copy circle No. 209

New welder gives 4 arc selections

This 8-page bulletin (1343) explains the Idealarc welder, one machine with both current and voltage control in both AC and DC welding. Selective arc control panel is illustrated and adaptability of machine described—producing soft, steady arc; low spatter, spray arc; digging arc; and forceful arc. *Lincoln Electric Co.*

. . . for your copy circle No. 210

How to clean with solvent detergents

How to use solvent detergents for removing carbon, grease, dirt, and paint is the subject of a 16-page brochure from Oakite. The illustrated booklet explains how solvent detergents remove dirt, discusses methods of application and details application equipment. *Oakite Products, Inc.*

. . . for your copy circle No. 211

How to use hardboard in your plant

How to use Masonite Presdwood in factory maintenance, materials handling, and processing is the subject of a 12-page two-color brochure, which tells how and where the material is being used, how to fabricate and bend, and how to use surface finishes. A list of the advantages of Presdwood is included along with a chart of the types available. *Masonite Corp.*

. . . for your copy circle No. 212

How to select proper steam traps

Common process and industrial steam traps are listed alphabetically in a 20-page booklet, which gives trap selection tables for each type, showing trap capacities in terms relative to the equipment and operating conditions encountered. Proper size of the trap to be used is read directly from the tables. A trap-capacity chart is included, along with a discussion of installation and safety factors. *Yarnall-Waring Co.*

. . . for your copy circle No. 213

Tear-resistant nylon cover material

A sample kit contains 14 swatches of Fiberthin, a coated nylon cover material, in several different colors and constructions. The kit, fully illustrated, lists 36 uses for the material and gives a properties chart. *U. S. Rubber Co.*

. . . for your copy circle No. 214

King-size booklet on scrap metal baling

Dempster-Balester, "nearest thing to automatic baling," is the subject of this impressive illustrated booklet with 12 fold-out pages. General description of all models is followed by close-ups (on a grand scale) of the six models available, with informative text and drawings on operating characteristics. Some typical installations, illustrated, complete the booklet. *Dempster Bros.*

. . . for your copy circle No. 215

Picture pamphlet on industrial process heating

A four-page picture pamphlet presents the engineering and equipment installation activities of Heat & Control. Twenty-seven pictures illustrate the variety of fields in which the company has made installations, indicating the scope of its process heating activity. *Heat & Controls, Inc.*

. . . for your copy circle No. 216

Rapistan controlled flow conveyor systems

Controlled flow conveyor systems that prevent flow-stoppage causes which reduce the effectiveness of an ordinary gravity and power conveyor system are treated in Rapids-Standard's brochure, which also gives a complete explanation of controlled flow. *Rapids-Standard Co., Inc.*

. . . for your copy circle No. 217

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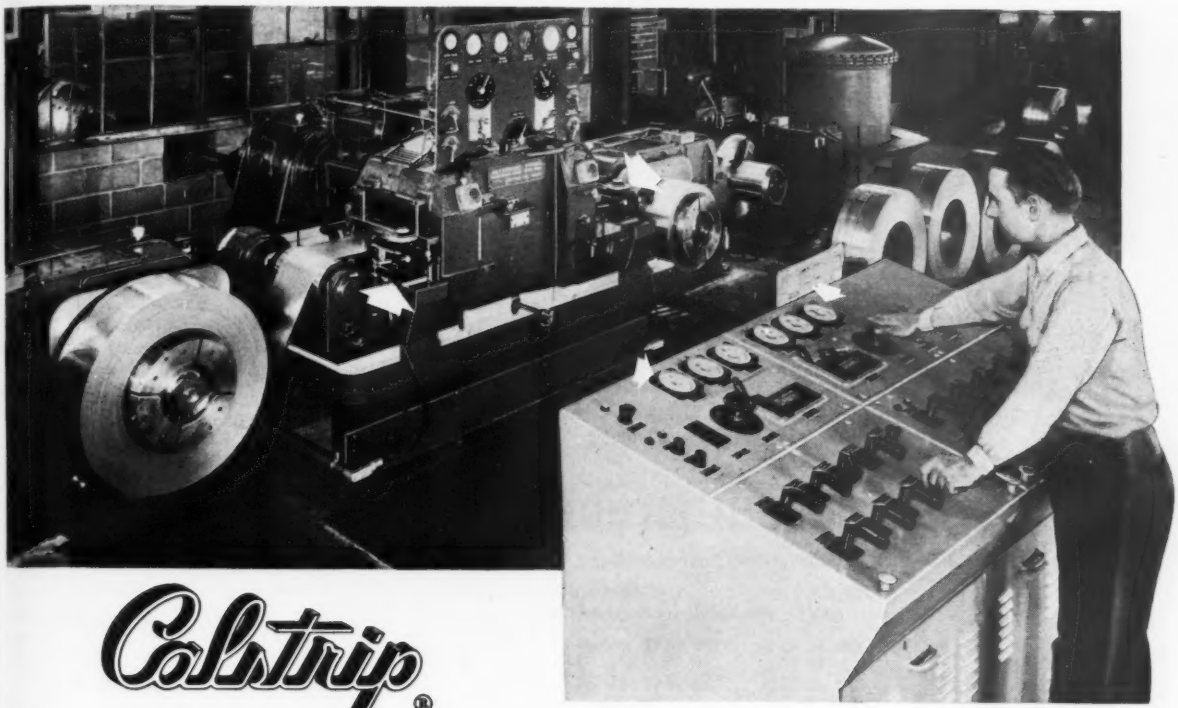
ONE REASON WHY



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For high speed production of parts which are stamped, formed, or drawn — order Calstrip steel. Your plant will produce more parts per ton of steel with fewer rejects, and your products will function better and look better if made from Calstrip steel.

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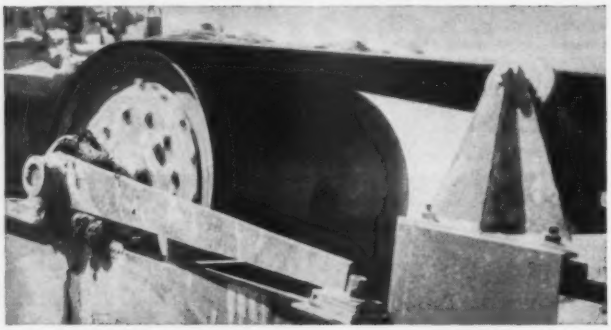

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offer the solution to your

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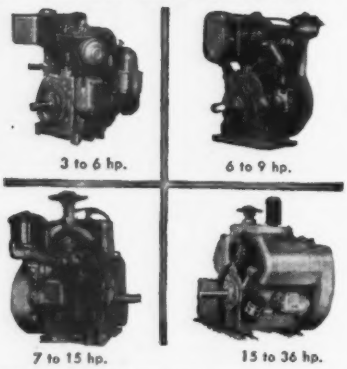

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Wisconsin Engineers will be glad to co-operate with you in adapting Wisconsin Air-Cooled Engines to your original equipment *most advantageously.* Tell us about your problem. "Spec" bulletins available on all Wisconsin Engines.

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World's Largest Builders of Heavy-Duty Air-Cooled Engines

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Diamond compound for micro-inch finishes

Folder is illustrated with micro-photographs and sketches explaining the characteristics of a first-rate lapping compound. Full description of Di-Met diamond compound, applicator, guns and cartridges, and color code for identifying micron sizes in various grades is presented. *Di-Met Corp.*

. . . for your copy circle No. 218

Industrial high-pressure pumps

New 8-page bulletin contains a general discussion of John Bean pumps applied to high-pressure pumping problems of many industries, with typical applications shown in photographs. Types SEP and OP Bean Royal pumps are covered in detail, with cross-section diagrams and specification tables. *John Bean Division, Food Machinery and Chemical Corp.*

. . . for your copy circle No. 219

52-page manual on mercury switch-equipped controls

Automatic controls, incorporating sealed mercury contact switches, for heating, refrigeration, air conditioning, and general industrial applications are treated in this 52-page book. Sections are devoted to pressure, temperature, and liquid level controls, as well as thermostats and relays. Indexed for easy reference. *Mercoid Corp.*

. . . for your copy circle No. 220

Heat exchanger and condenser tubes

Bulletin TB-329B covers in 8 pages the pertinent facts about popular grades of carbon, alloy, and stainless steel heat exchanger tubing, both seamless and welded. A special section explains expanding method of installing heat exchanger and condenser tubes. *Tubular Products Division, Babcock & Wilcox Co.*

. . . for your copy circle No. 221

West Coast lumber purchasing directory

West Coast Lumbermen's Assoc. has issued a 42-page "Where to Buy" directory for the four West Coast species of lumber—Douglas fir, West Coast hemlock. Western red cedar, and Sitka spruce. Over 200 mills are listed in chart form, along with addresses, capacity, equipment, special services available, species of lumber handled, and lumber items manufactured. *West Coast Lumbermen's Assoc.*

. . . for your copy circle No. 222

Lubricants and greases for extreme service

New 8-page catalog carries technical information on qualities and specific industrial uses for multi-purpose greases, outside gear and track roller lubricants, MX gear oils with molydisulphide, chain and gear oil, Kopr-Kote anti-seize compound, Thick-or-Thin sealing compound, and Moly-Spray air-dry lubricant. *Jet-Lube, Inc.*

. . . for your copy circle No. 223

Picture book on Puget custom fabricating service

A 12-page picture book outlines the custom fabricating facilities and services offered by Puget Sound Fabricators. On-the-job pictures show a variety of fabricating applications, including the company's facilities and techniques for non-destructive testing of tank and vessel welds through the use of X-ray and gamma ray examination. The booklet will be of use to firms anticipating custom fabricating jobs for plants and installations. *Puget Sound Fabricators, Inc.*

. . . for your copy circle No. 224

176-page data book on electric cranes

A case-bound, 176-page volume on electric traveling cranes presents information on the preparation and checking of specifications for new projects as well as the application of new cranes to existing structures. Seventeen sections cover such subjects as operating speeds, overhead clearances, elements of design, safety features, erection, operation and maintenance, and sample specifications for different classes of service. For your copy write directly on business letterhead to *Whiting Corp., Dept. WI, Harvey, Ill.*

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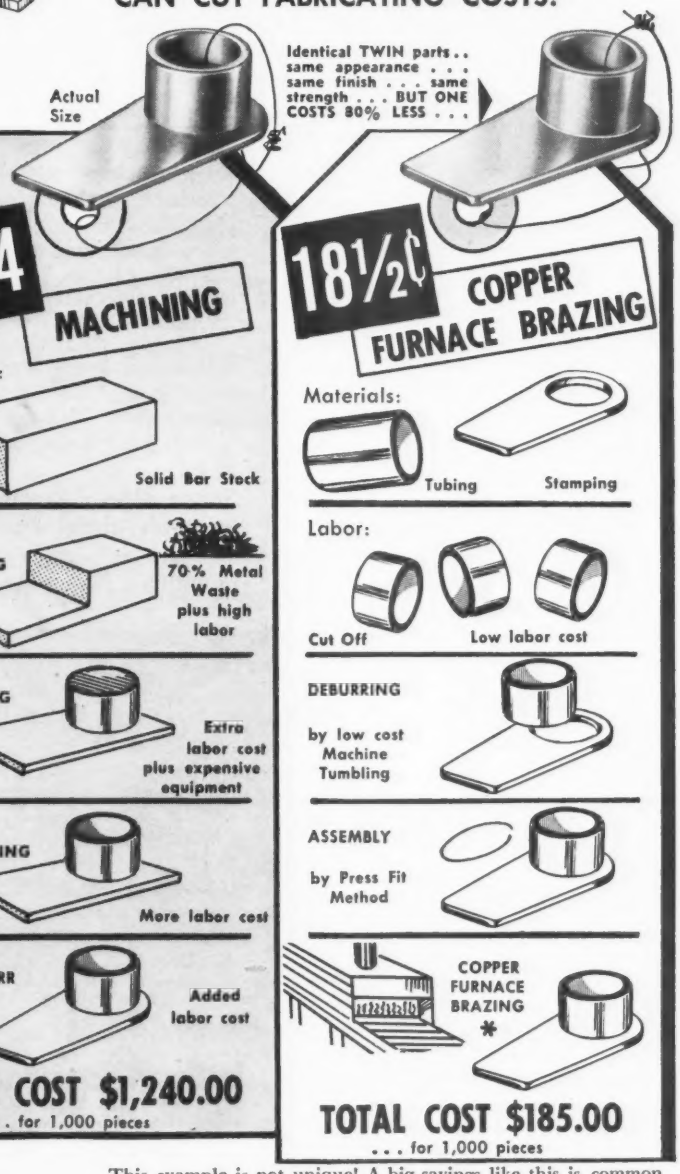

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Los Angeles 32, California

. . . for more details, circle No. 53

50 pages on airtube system carriers

"Airtube on Target" is a 50-page book describing several sizes of airtube systems, central desk, and semi- and automatic switch systems. One section is devoted to different types of carriers, and another to case history reports of airtube installations in a cross section of industries. Fully illustrated with pictures and diagrams. *Lamson Corp.*

. . . for your copy circle No. 225

24-page book on Kaiser products and services

Products and services available from Kaiser Aluminum are the subject of a 24-page booklet, which includes data on aluminum alloy, forms, mechanical and physical properties, applications, fabricating, and finishing techniques and availability. Illustrated booklet has 31 charts. *Kaiser Aluminum & Chemical Corp.*

. . . for your copy circle No. 226

Space control through movable metal walls

A 68-page book gives detailed information on flexible interiors through the use of movable metal walls. Design and construction features and specifications are given for three types of walls—flush pilaster, new executive, and commercial. Illustrated with more than 50 photographs of typical installations, this book also includes a description of the entire line of Mills accessories and hardware. *Mills Co.*

. . . for your copy circle No. 227

Flexible metal hose and coupling data

Full range of flexible metal hose products is covered, with complete coupling data, in this 12-page illustrated catalog (No. 152). Each Flexon product is illustrated, dimension or specification tables are given, and typical applications are pictured. A 4-step metal hose selection guide is included. *Flexonics Corp.*

. . . for your copy circle No. 228

Visual alarm system diagrams and dimensions

"Visual Alarm Systems," a 32-page loose-leaf booklet from Autocall, includes information on the company's complete line of annunciators in the form of schematic wiring diagrams, photographs, and dimension charts and diagrams. Instructions for ordering the units are included. *Autocall Co.*

. . . for your copy circle No. 229

Protective coating for thermal insulation

An eight-page booklet describes uses for Laykold Weathercoat, a cold-applied asphaltic composition which provides a protective coating on all types of thermal insulation. Characteristics of the product are given, along with illustrations showing how and where it may be used. *American Bitumuls & Asphalt Co.*

. . . for your copy circle No. 230

Guide to motor freight shipments to Canada

"How to Prepare Your Shipments to Canada" is a 12-page kit containing United States shippers' export declaration forms and Canadian invoice forms with complete information and illustrations showing how to complete the export documents. The kit, which has a list of things you must do and additional helpful hints, was designed as a guide for exporting merchandise by motor freight from the United States to Canada. *Consolidated Freightways*

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Ask Standard *how*

Live Roller and Gravity Roller System handles 55 gal. drums from storage thru filling and weighing operations to shipping

to cut costs with conveyors for handling heavy, bulky commodities

STANDARD conveyor systems keep heavy, bulky commodities moving with minimum manpower and time loss. Systems can be job-tailored to solve any specific material handling problem — and to meet a wide range of requirements.

With more than 50 years of experience in conveyor application, Standard engineers are qualified to help solve your material handling problems. The Standard line of power and gravity conveyors is complete for either permanent or portable systems.

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Call the Standard engineer listed in your classified phone book or write direct for Bulletin 309 — address Dept. E-3.

. . . for more details, circle No. 54 on Reader Service Postcard

Low-impedance feeder enclosed bus-bar system

A low-impedance feeder busway system designed for general-purpose power distribution applications where heavy loads are served or where low-voltage drop is essential is described in a 16-page bulletin. Construction and application of the enclosed bus-bar system are detailed, and ratings, weights, dimensions, installation data, and guide forms specifications are listed. *General Electric Co.*

. . . for your copy circle No. 232

Applications of the ultrasonic reflectoscope

Application of the ultrasonic reflectoscope for non-destructive testing of products and equipment for detection and location of defects is the subject of an eight-page bulletin from Sperry. The booklet explains the principle of ultrasonic inspection in simplified terms and illustrates the types of equipment available and their uses. *Sperry Products, Inc.*

. . . for your copy circle No. 233

Technical data on plastic panels

New 8-page bulletin (AIA File No. 26-A-9) on Filon reinforced Fiberglas and nylon panels suggests a variety of applications in industry and commerce and gives detailed information on all standard types and sizes. Drawings show how to build awnings, sidelights, roofs, and skylights, etc. Construction details are given in schematic form. *Filon Plastics Corp.*

. . . for your copy circle No. 234

Quarterly publication on corrosion control

"Corrosion Control Reporter" is a quarterly publication of Amercoat Corp., manufacturer of preparations for the control of corrosion. By circling key number to get on the company's mailing list you will receive these publications, which contain several pertinent articles, news notes, and recommended reading on corrosion. *Amercoat Corp.*

. . . for your copy circle No. 235

Complete information on helical gear drives

Link-Belt's helical gear drives are described in a 16-page booklet which includes load classes for over 250 applications, overhung load ratings and dimension tables, instructions for proper selection and cut-away views of both double and triple reduction drives. A discussion of backstops, couplings, and mountings is also included. *Link-Belt Co.*

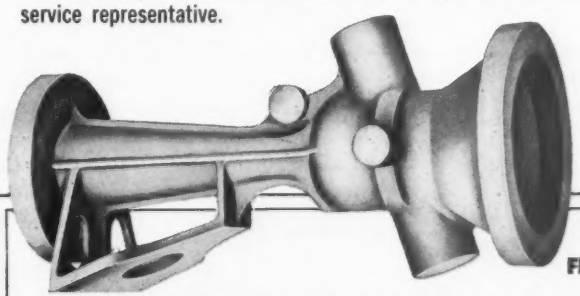
. . . for your copy circle No. 236

DESIGN PARTS FOR THE SHAPE YOU WANT—Investment Casting can produce the most intricately shaped parts with little or no secondary machining required.

CHOOSE THE ALLOY YOU WANT—Investment Castings are produced in any of the ferrous or non-ferrous alloys, including magnesium.

USE THE PROCESS WISELY—Give full consideration to weight, dimensions, tolerances and surface finishes when designing for Investment Casting. Take full advantage of the economies inherent in the process.

CONSULT ARWOOD ENGINEERS—Arwood casting engineers will gladly consult with you on your design and production problems, helping you translate them into finished products. Write for the name of your nearest ARWOOD sales and service representative.



DESIGN FLEXIBILITY

Parts similar to this stainless steel valve body for an air flow controller often require several changes before design is finalized. Due to the relatively low cost of dies and die changes, the investment casting process has proven an inexpensive and flexible method.

ARWOOD

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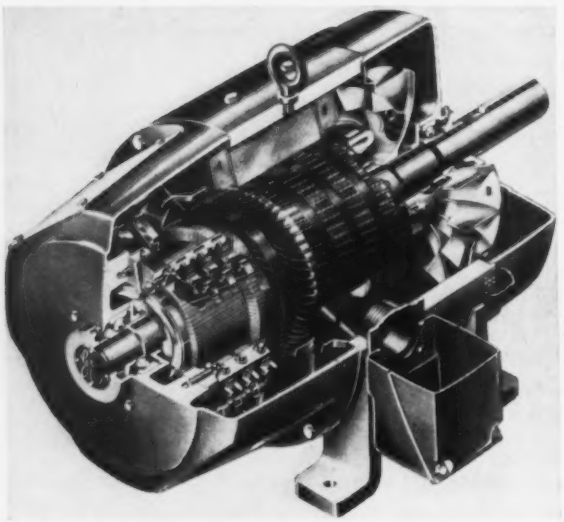
. . . for more details, circle No. 55 on Reader Service Postcard

NEW EQUIPMENT for Western plant operation, production, and maintenance

USE RIP-OUT POSTCARD, page 67, for more information on products described.

COMPLETE D-C MOTOR LINE . . . built to new NEMA standards



The first complete line of direct current motors and generators built to new NEMA standards for future design has been designed, manufactured, and is being marketed by General Electric. Designed for use in all industries for an extremely wide variety of applications, the new line—known as the Kinamatic, offers motors rated from 1 to 150 hp. at 1,750 rpm. and includes ratings in this torque range at all standard speed values. Generator ratings are from ¾ to 100 kw. at 1,750 rpm., with similar ratings at other speeds. Designed for versatility, the motors can be used in either constant or adjustable speed operations.

New NEMA standards which guided the design of the new line of motors and generators have been improved to provide ratings with wider speed ranges and greater choice of speed range with only 20% of the previous number of machines required to provide such selection. Instead of one line of constant-speed motors and another line of adjustable-speed motors, the new line provides the maximum speed range by field control in each rating. Thus, selection and applications of the motors and generators have been greatly simplified and required inventories of spare motors and parts reduced.

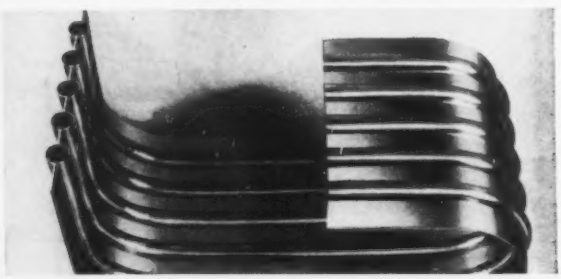
New insulation materials used in exciting and commutating field coils (A and B in photo) provides a more compact unit. Horsepower per pound has been increased 33%. Smaller machines also have lower armature inertia and faster response—an important consideration on the many applications which require d-c motors to start, stop, or change speed frequently.

Motor torque pulsations at extremely low speeds and generator voltage ripple have been reduced by making all armatures with skewed armature slots. A new brush rigging (C) has been incorporated which helps the brush to ride more smoothly, provides a more constant pressure on the brush during wear, and permits easy inspection and replacement of brushes.

An improved ventilation system on the new line provides more air flow with a large but light weight cast aluminum fan (D). Need for accessories such as tachometers, speed limit devices, brakes, blowers, etc., has been recognized and the motor and generator units have been designed to facilitate in-use or in-stock addition of these items without modification. *General Electric Co.*

. . . for more details, circle No. 237 on postcard

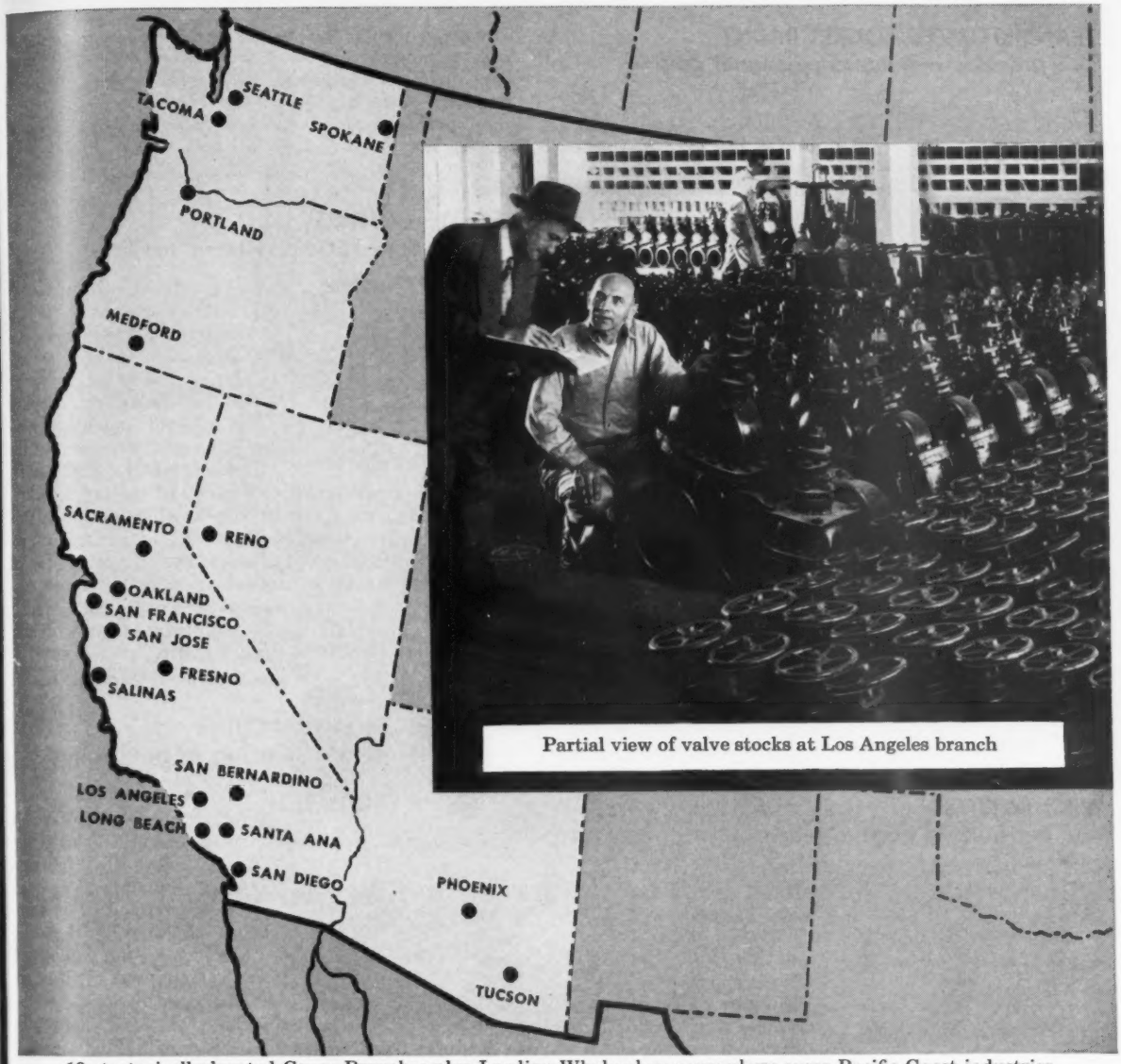
TUBE-IN-STRIP . . . made from a single sheet of metal



Tube-in-Strip is a single strip or sheet of solid copper, brass, or aluminum in which tubes are inflated to desired running lengths in a variety of shapes or sizes. Tube diameters, which vary from 3/16 in. to ⅝ in., may be the same or varied within a single piece of metal or may be inflated on one side and flat on the other. The stripping is available in coils or in cut flat sheets in widths up to 16 in.

Coils and sheets of Tube-in-Strip don't differ greatly from the standard strip and roll products produced in the rolling mill. However, this material has incorporated within it expandable portions which can be inflated by the user into continuous running lengths of tube of whatever size and spacing or combinations of sizes and spacings are desired. Tube spacing can be as close as ¼ in. or closer in some instances, and as widely apart as the width of the metal permits. Tube wall gage can vary from .0025 in. to whatever inflation equipment permits. Stamping, forming, bending, and drawing operations can be performed before inflation, or the metal can be inflated before bending, perforation, and similar operations, and then further processed by common pipe and tube bending techniques. The metal can be joined by standard commercial techniques. Immediate applications are indicated in the heat exchanger field, chemicals, food, and petroleum processing, electronics, and others. *Revere Copper & Brass, Inc.*

. . . for more details, circle No. 238 on postcard



Partial view of valve stocks at Los Angeles branch

19 strategically located Crane Branches plus Leading Wholesalers everywhere serve Pacific Coast industries

You can get better piping faster from your local Crane outlets

You save both time and money when you order piping materials from your local Crane outlet. You get such service from 19 strategically located Crane Branches plus Crane Wholesalers throughout the Pacific Coast industrial areas.

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Since 1855—Crane Co., General Offices: Chicago 5, Ill. Branches and Wholesalers Serving All Areas

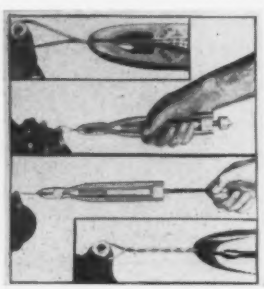
. . . for more details, circle No. 56 on Reader Service Postcard

TRANSISTORIZED POCKET RADIO
. . . provides individual personnel paging

Handie-Talkie is a low-frequency, transistorized radio paging system which individually alerts any paged staff member within a restricted plant or building area, doing away with the necessity of a public-address type system of paging. No one but the paged person is aware that a message is being transmitted. System consists of a selector console with individual buttons for key personnel, an FM transmitter that radiates alerting tones and voice messages within a specified area, and the individual radio receivers. An operator presses the proper selector button to activate a particular person's receiver alerting mechanism, then speaks into a desk microphone. The system consists of matched precision vibrating reed mechanisms, one in each pocket receiver to correspond with another activated by the console selector button. Portable receiver weighs 10 oz. and can be clipped in a pocket or worn on a belt. Powered by a 4-volt mercury cell battery, the unit's reception is immune to common types of interference. Battery life is approximately four 40-hr. weeks. No FCC license is required for the system. *Motorola Communications & Electronics, Inc.*

. . . for more details, circle No. 239 on postcard

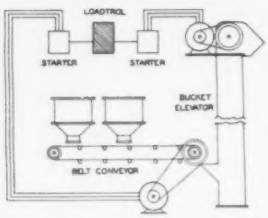
WIRE TWISTER
. . . for work in hard-to-reach places



Designed particularly for work in narrow, hard-to-reach places, this wire twister has a diagonal grip-head with a slender nose, and comes in two sizes: 12-in. length for assembly line work and 9-in. length for bench and sub-assembly work. The twister is three tools in one—pliers, cutter, and twister—and works simply. Two ends of the wire are gripped in the jaws; center sleeve is slipped down, locking handles; a pull of the knob and the spiral rod spins the pliers and produces a uniform twist in the wire; a squeeze of the handles releases center sleeve and opens plier jaws. All exposed parts are chemically treated to prevent rusting. *Ralph C. Robinson Co.*

. . . for more details, circle No. 240 on postcard

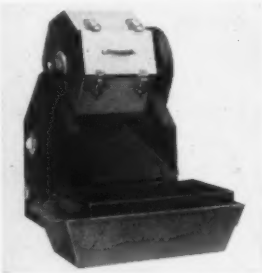
REMOTE CONTROL UNIT
. . . for 5 to 150-hp. electric motors



Loadtrol, activated by either an over- or under-load current signal, provides automatic remote control for electric motors in the 5- to 150-hp. range. Through a solenoid and a coil-activated mercury switch, the unit provides control operation of a single motor or of a group of motors. Loadtrol works through the motor starter to accomplish the stop and start control. Automatic functions include motor protection by elimination of hazards to motors that are forced to labor under over- or under-load conditions, and continuous full-capacity operation of feeders and similar equipment, by permitting motor operation only during periods of optimum load. *Rietz Mfg. Co.*

. . . for more details, circle No. 241 on postcard

BARREL FINISHING MACHINE
. . . for small-lot deburring or burnishing



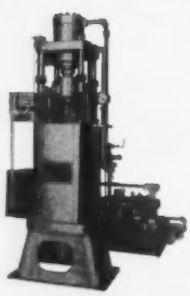
A built-in unloading chute in the Mastercraft variable speed barrel finishing machine minimizes the handling of small parts or small lots in deburring or burnishing operations. Work pieces, abrasive media, water, and compound unload from the barrel opening down the chute, directly onto the separating screens, where the parts remain. Media can be reloaded into the barrel from the receiving pan. Standard equipment includes a timer, 3/16-in natural gum rubber vulcanized lining, screen, pan, and wash-out door. *Mido Products*

. . . for more details, circle No. 242 on postcard

BETTER QUALITY EQUIPMENT FOR THE METALWORKING INDUSTRIES

KUX TABLET PRESSES

Kux Presses have become the accepted standard machines for automatically forming, at high production speeds, tablets and parts from dry, powdered or granulated materials. They are available in the Spindle, Toggle, Multiple Motion, Rotary, and the big, new 400 series of totally enclosed, mechanical and hydraulic powered metal presses with a range in capacity to 1000 tons and 15" diameter tablets. Rigidity of design and ruggedness of construction enable these machines to meet the most severe demands for service. In addition to their standard line of tablet presses Kux also manufactures special presses for automatic sizing or coining.



KUX DIE CASTING MACHINES

Kux produces the most complete line of air or hydraulically operated machines for lead, tin, zinc, aluminum, brass or magnesium die casting with a size and model for every die casting need. Simple and safe to operate these machines are low in original and upkeep costs and are used in hundreds of plants in round the clock production.

All machines are equipped with extra large oil reservoirs, oversize oil coolers and filters. They have a speed shot up to 1200 feet per minute and a range in locking pressures up to 1000 tons.

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For Complete Information

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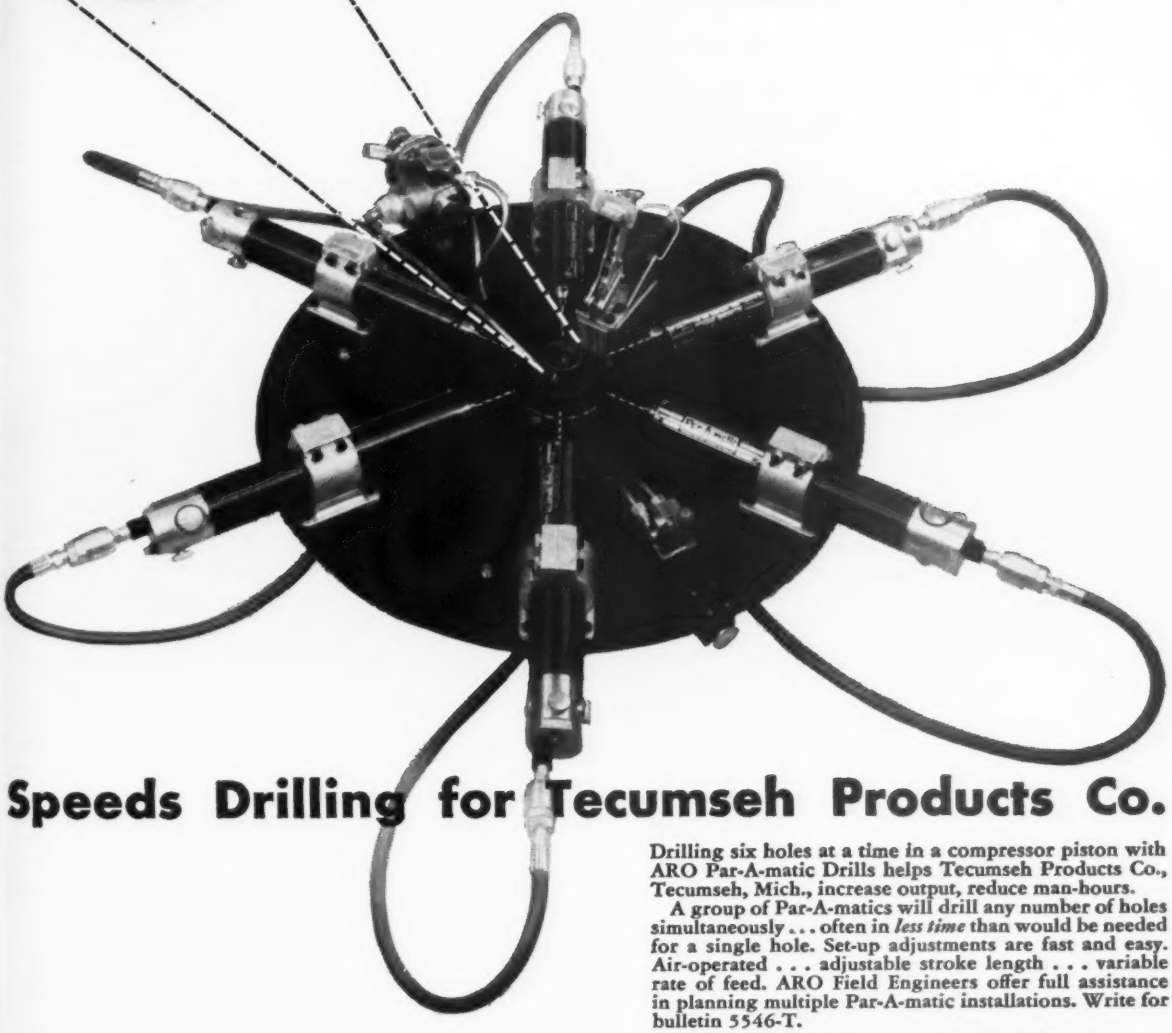
AUTOMATION WITH ARO PAR-A-MATIC DRILLS



Speeds Drilling for Tecumseh Products Co.

Drilling six holes at a time in a compressor piston with ARO Par-A-matic Drills helps Tecumseh Products Co., Tecumseh, Mich., increase output, reduce man-hours.

A group of Par-A-matics will drill any number of holes simultaneously . . . often in *less time* than would be needed for a single hole. Set-up adjustments are fast and easy. Air-operated . . . adjustable stroke length . . . variable rate of feed. ARO Field Engineers offer full assistance in planning multiple Par-A-matic installations. Write for bulletin 5546-T.

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IN ACTION
AT THE ASTE SHOW
BOOTH 638

See the new ARO Par-A-matic and automatic drills . . . the new multiple nutsetter . . . the new link chain hoist and other ARO tools.

ARO ® **AIR TOOLS**

Also . . . AIR HOISTS . . . LUBRICATING EQUIPMENT . . . AIRCRAFT PRODUCTS . . . GREASE FITTINGS

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Apple Pie Order!

In the Tool Room

A place for everything and everything always in place. Drills, reamers, milling cutters, miscellaneous tools, bolts, screws, taps, discs, machine parts, etc. Speedy filing, storing and issuing are yours when you install:

BERGER MANUFACTURING DIVISION REPUBLIC STEEL CORPORATION

TOOL ROOM EQUIPMENT!

Standard shelving units may be purchased with special-purpose tool room units. Just select one or more in any grouping with shelves and dividers to suit your needs. They are adjustable both vertically and horizontally. Available for prompt delivery from local stocks.

Other Berger Products:

Steel lockers, work benches, shop desks, bar racks, office desks, files and tables.

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Need a really accurate collet chuck?
Before you buy **COMPARE** the new
HANCOCK Ball-Bearing **CHUKOLLET**
with any collet holder.

Pat. Pend.

COMPARE for accuracy!
COMPARE for versatility!
COMPARE for gripping power!
COMPARE set-up time!
COMPARE price!

No collet chuck is as versatile, can grip as tightly or as accurately as the new Chukollet. Can be used on any machine in the shop.

No other collet chuck has an adjustable stop for positive axial location to .0005 inch! 5C collet is not drawn in while closing.

See for yourself. Make a test in your own shop next time you have a job that demands the ultimate in axial and radial accuracy. Remember, Chukollet is guaranteed. Money refunded in 30 days if not completely satisfied! Send for literature today.

Manufacturers' agents and dealers, several territories available.

HANCOCK MFG. CO.
Santa Clara, Calif.

. . . for more details, circle No. 60 on Reader Service Postcard

TORQUE SCREW DRIVER
. . . controls gage block tie rod screws

Use of a torque screw driver after conventional assembly of square gage blocks assures the maintenance of a rigid assembly of wrung blocks without distortion. When turned clockwise the screw driver applies the proper pressure to the assembly; when turned counter-clockwise the nib locks to the knurled handle so that the clamping screw may be loosened. Designed for use with any standard square gage block assembly, the screw driver makes possible consistent repeat accuracy in assembling and reassembling stacks of the same dimension. *Do-All Co.*

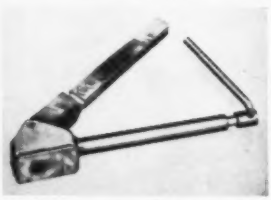
. . . for more details, circle No. 243 on postcard

FLAT-PLATE POWER BATTERIES
. . . cost less for electric lift trucks

A line of flat-plate motive power batteries, manufactured under the trade name Exide-Powerclad, is suitable for use in electric industrial fork and lift trucks, and for mine locomotive power and marine applications. The batteries, with triple insulation, have positive plate grids constructed of Silvium, a corrosion-resistant alloy. Vitrex and perforated polyvinyl chloride retainers, a polyethylene insulating strip, and a deeply grooved microporous rubber separator are used to achieve positive plate insulation. *Exide Industrial Division, Electric Storage Battery Co.*

. . . for more details, circle No. 244 on postcard

TIP PULLER
. . . removes spot welder tips



A tool for removing spot welder tips, called the Ejecto tip puller, tightens over the tip by means of a small high leverage crank. Easy pressure on the handles withdraws the tip quickly and without damage to either tip or horn, according to the manufacturer. *Miller Electric Manufacturing Co., Inc.*

. . . for more details, circle No. 245 on postcard

TEFLON HOSE LINE
. . . with detachable, reusable fitting

The "666" hose line features a tetrafluoroethylene (Teflon) inner tube and a specially designed detachable, reusable fitting. The hose, which has the ability to withstand extreme temperatures from minus 100 deg. F. to 500 deg. F., is impervious to acids and many other fluids which have not been transportable by synthetic or natural rubber hose. The detachable, reusable fitting can be

UNITED ANNOUNCES NEW DC-6A CARGOLINERS

Five new DC-6A Cargoliners® are joining the United Air Lines fleet—increasing our all-cargo space by nearly 70%! Each of the new DC-6As carries up to 30,000 pounds of cargo, at 300 miles an hour . . . and accommodates single pieces up to 76" x 81" x 115", and up to 8000 pounds.

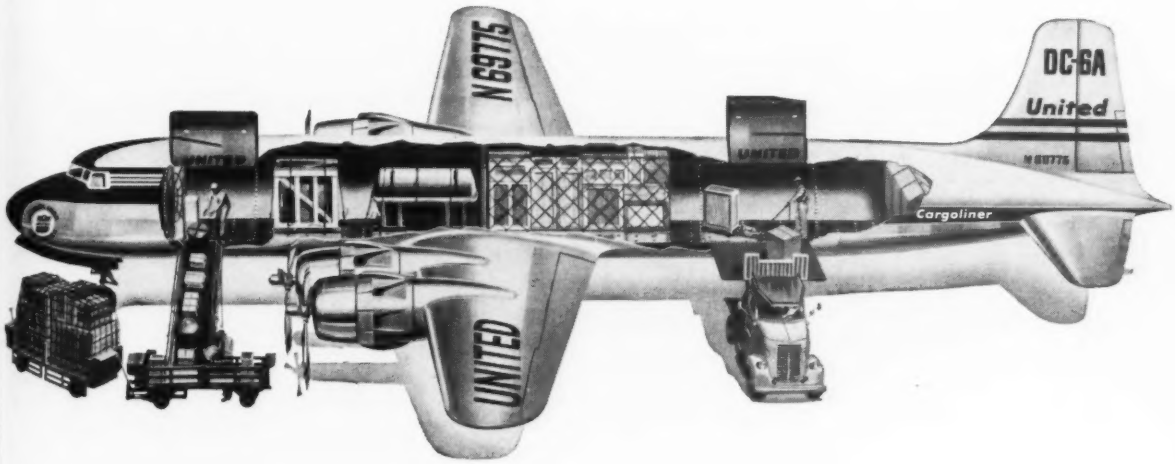
Each is equipped with radar, a United cargoplane "exclusive" for smoother flight and better on-time performance—plus many other improvements of special interest to shippers.

In addition, all of our regular passenger Mainliners® carry cargo to the 80 cities on our route. And only United offers you these extra services:

Telemeter Air Bill. Special new equipment and United's vast communications system makes possible the handling of complete air bills by wire. Advance notice of expected arrivals is possible while shipments are still in the air. This means the consignee can have pickup arrangements completed when the plane arrives. No "time out" for your shipment!

Reserved Air Freight Space. Space can be reserved on any United plane, or connecting world-wide carrier!

It all adds up to a completely new standard of air freight service for you!

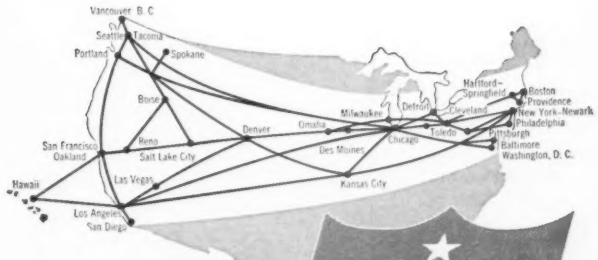


New, Exclusive Features for your benefit . . .

Tie-Down Strength Greater than any other airline. All rings in the main cabin between doors are 5,000-lb. Twelve 10,000-lb. rings. All metal floors.

Aluminum Pallets allow preloading, speed handling, protect cargo.

Separate Temperature Control for cockpit and cargo compartments, so special cargo can be kept as warm—or as cold—as it needs to be.



UNITED AIR LINES

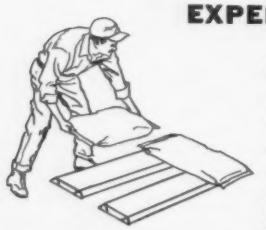
For service or information, call or write the nearest United Air Lines Representative. Write for new booklet on air freight tailored to your needs! Cargo Sales Division, Dept. WT-3, United Air Lines, 5959 S. Cicero Avenue, Chicago 38, Illinois.

. . . for more details, circle No. 61 on Reader Service Postcard

GREAT LAKES CARBON CORPORATION
announces the appointment of
EVJU PRODUCTS COMPANY
465 California St., San Francisco
and
6829 Rita Ave., Huntington Park
as
"SLEEV-A-DORE" SALES AGENTS
for California and Hawaii

Sleev-A-dore

EXPENDABLE PALLETS



...provide a new money-saving method of materials handling.

- *Low cost*
- *High strength*
- *Light weight*

Tested and proved both in severe laboratory tests and in actual transcontinental shipments.

GREAT LAKES CARBON CORPORATION
612 So. Flower St., Los Angeles 17, Calif.
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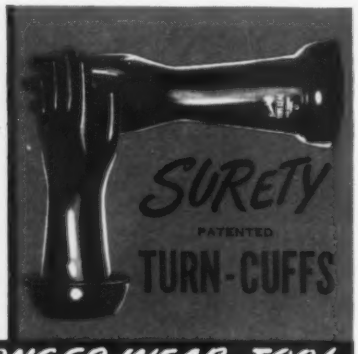
MORE SAFETY PER PAIR



AND LONGER WEAR, TOO!

EXCLUSIVE ADVANTAGES FOR MAXIMUM PROTECTION

No other gloves offer so much hand protection in chemicals, acids, solvents, oils, etc. — recognized by officials for prevention of dermatitis, etc. Cuffs up prevent liquids running inside and onto arms—cuffs down provide two inch longer gauntlet, and users report up to 14 to 1 longer service. Better ask your jobber.

TURN-CUFFS ARE AVAILABLE IN NEOPRENE, SURESEAL AND NATURAL RUBBER. SEND FOR COMPLETE DESCRIPTIVE BULLETINS TODAY.

THE SURETY RUBBER CO. CANTON, OHIO

Western Division: 544 Market St., San Francisco 4, California

... for more details, circle No. 63 on Reader Service Postcard

attached and detached by hand without special tools, allowing for the assembly of new hose lines or the repair of old ones with a minimum of delay and difficulty. *Aeroquip Corp.*

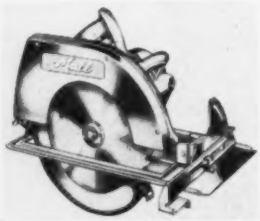
... for more details, circle No. 246 on postcard

PHONE RECEIVER AMPLIFIER
... miniature unit ups volume seven times

Tel-O-Aid, a tiny electronic transistorized unit about the size of a pencil eraser, slips over the telephone receiver and provides a powerful amplifier for weak long distance calls, other poor phone connections, and for phones in noisy plant locations. Amplification comes from three hermetically sealed transistors. Miniature mercury cell batteries provide power that should last for about a year with normal use. Weighing only 3 oz., Tel-O-Aid clips to the phone and is easily attached and removed. *Fisher Research Laboratory, Inc.*

... for more details, circle No. 247 on postcard

HIGH SPEED SAW
... designed for abrasive wheels



Suitable for hard surface cutting jobs, such as steel, stone, terrazzo, non-ferrous metal, concrete, and compositions, this high speed saw is designed for abrasive wheels and built for continuous operation. This electric saw, Model 192, is powered by a precision ball bearing a-c/d-c 25- to 60-cycle motor. Its motor air exhaust is directed away from the cutting line, keeping dust at a minimum. Motor air intake is equipped with a renewable dust filter. Other features include quick depth-bevel adjustments, rip fence guide, automatic telescoping guard, and lightweight die cast aluminum alloy housing. Saw comes equipped with a 9-in. Abraso-Flex cut-off wheel, blade wrench, steel carrying case, extra air filter bat, lubricant, and 15-ft. cord with plug and ground. *Mall Tool Co.*

... for more details, circle No. 248 on postcard

STRAPPING TAPE CUTTER
... made of plastic to eliminate injury dangers

Permacel 4G is an adjustable cutter, made of heavy molded plastic with a steel cutting edge, for use with heavy-duty strapping tapes. A fine-honed edge will cut tapes of ½ in. and ¾ in. and is easily adapted for either size. The cutter, which costs 49c, eliminates the need for assorted knife blades, scissors, and razor blades in shipping rooms. *Permacel Tape Corp.*

... for more details, circle No. 249 on postcard

If you ship LTL* in our territory you are probably already a CF customer. And we love you! For more than 27 years LTL has been the backbone of CF's business. Our 58 terminals have been carefully designed to move your shipments rapidly, safely and on schedule with the latest in mechanized or direct cross dock loading. And our personnel are trained to serve your individual requirements. It is because we like to serve you better that CF serves *more points direct* than any other carrier in the West. So when you ship LTL, or full load, take advantage of CF's direct routing and fast daily schedules. Call Consolidated Freightways—*your complete* motor freight service.

*Less Than Truck Load

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MINNEAPOLIS-ST. PAUL
CHICAGO

Terminals in 49 other key cities from the Pacific Coast to the Great Lakes... Thru service to all major eastern cities.

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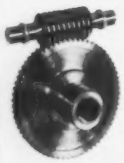
50 YEARS GEAR SERVICE TO INDUSTRY



The More Particular You Are In Selecting Gears, The More Likely You Are To Select JOHNSON

JOHNSON GEAR AND MANUFACTURING CO.
8th & PARKER STREETS
BERKELEY 10, CALIFORNIA

... for more details, circle No. 65 on Reader Service Postcard

STEEL Stanho PRODUCTS

FLAT BOTTOM WOODRUFF KEYS

MACHINE KEYS

TAPER PINS

the Quality Line

of Precision Made Steel Products

KEYS—ALL TYPES • COTTER PINS
TAPER PINS • STRAIGHT PINS
MACHINE RACK • SPECIAL PARTS

KOOLHEAD Foundry Chill Nails

WRITE for DESCRIPTION and PRICES

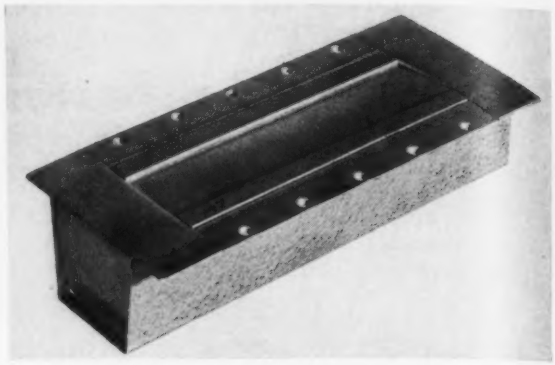
STANDARD HORSE NAIL CORP
NEW BRIGHTON PA

M4

Western Factory Sales Representative
GRETHER & GRETHER, P. O. Box 47, Stockton, California

... for more details, circle No. 66 on Reader Service Postcard

NON-ELECTRIC MAGNETS
. . . for efficient iron removal



A line of non-electric Alnico Perma-Plate magnets has been designed for more efficient removal of tramp iron. The magnets are particularly effective in attracting iron from moving material, according to the manufacturer. The step face of the magnet allows the moving material to flow smoothly, without interruption by mechanical barriers, while the exposed side of the leading magnetic pole provides a recessed holding zone out of the direct path of the burden. Attached iron is held firmly, while the wide gap between the magnetic poles assures a magnetic field which reaches out effectively. Multiple poles make possible extraction of tramp iron from fast moving or entangled burdens. *Dings Magnetic Separator Co.*

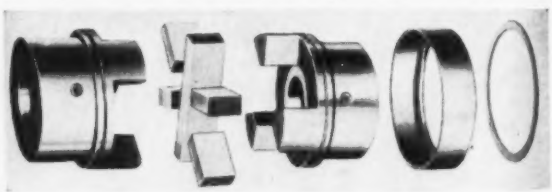
. . . for more details, circle No. 250 on postcard

IMPROVED SOLVENT CEMENT
. . . for joining PVC pipe fittings, flanges

A joint as strong or stronger than the pipe itself is possible with an improved solvent cement for joining polyvinyl chloride pipe fittings and flanges. A joint can be handled in an hour after cement, which is applied with an ordinary paint brush, is used, and reaches working strength in 48 hr. *Tube Turns Plastic, Inc.*

. . . for more details, circle No. 251 on postcard

REMOVABLE FLEXIBLE COUPLING
. . . provides easy assembly, disassembly



The radial removability of this flexible coupling is accomplished by special cushions cut so that they are held in position by a standard Type C collar when the coupling is assembled. When the collar is removed the cushions can be easily removed, allowing the coupling half and connected shaft to be rotated so that the intermeshing jaws slide into the stationary coupling half which has not been removed. Dissembly is accomplished in a similar manner. The coupling is available in sizes ranging from 2.58 to 29.6 hp. at 100 rpm. The lubrication-free unit is suited to centrifugal and impeller pumps and other installations where radial removability is required. *Lovejoy Flexible Coupling Co.*

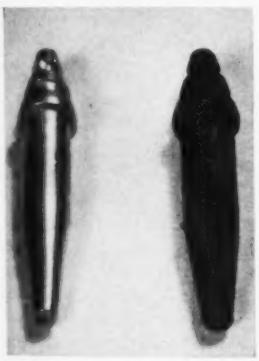
. . . for more details, circle No. 252 on postcard

POCKET-SIZE AUDIO-AMPLIFIER
. . . for sound detection and amplification

Detection and amplification of sounds from termites to fluid leaks are possible with a pocket-size, transistorized audio-amplifier. Amplification to 85 db. gain is provided by three miniature, hermetically sealed, low noise transistors, while power is supplied by a single, small dry cell battery good for about 100 hr. of normal use. Weighing only 15 oz., the unit measures 4 x 2½ x 1¾ in., and comes with a leather carrying case. *Fisher Research Laboratory, Inc.*

. . . for more details, circle No. 253 on postcard

FLAME CUTTING TIPS
. . . reconditioned with high pressure process



Straight flame cutting tips with partially closed orifices, distorted or burned tip ends, or enlarged oxygen jets may be renewed and resized at a savings of up to 80% of the cost of a new tip, according to Pacific Tip. Carbon deposits in the holes are emulsified by a chemical process, and then blasted out with an abrasive compound. Tips are then swedged on special mandrels to restore proper size orifices, and correct seating angle is restored by precision grinding. Finally, tips are polished and flame tested. Service charge is $1.35 per tip. *Pacific Tip Co.*

. . . for more details, circle No. 254 on postcard

WATER-TREATING CHEMICAL COMPOUND
. . . removes hard water scale build-up

Hard water scale build-up on or in valves, pipes, tanks, cooling towers, evaporators, boilers, heat exchangers, etc., may be prevented or removed by a chemical compound called Ke-Tone. By addition to water at the rate of 1 lb. to 200,000 grains of contained water hardness, Ke-Tone produces a gradual but continuous rise in water hardness as scale already deposited is disintegrating or going back into solution. Ke-Tone suspends scale particles in all areas which favor precipitation, but allows the scale to dissolve in other parts of the system where solubility product relationships favor solution of the scale. *United Chemical Corp. of New Mexico*

. . . for more details, circle No. 255 on postcard

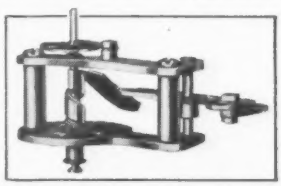
INDUSTRIAL TESTING EQUIPMENT
AND INSTRUMENTS SINCE 1919

Call Pacific SCIENTIFIC

Helicoid Gages

FOR PRESSURE, VACUUM OR COMPOUND SERVICE!

LONG LIFE ACCURACY... no gears or teeth to wear in this exclusive Helicoid design!



This simple cam and roller design is the heart of Helicoid's long-life accuracy. There are no gears or teeth to wear... no constant servicing or maintenance. The smooth-acting Helicoid movement is positive and precise, yet in actual service it is proved to outlast and outperform gear-type gages.

HELICOID BOURDON TUBES are designed to give maximum torque with minimum stress. They provide greater endurance... withstand millions of pulsations without stretching, leaking or cracking.

Send for complete information on Helicoid... gages that cost less per gage, per year. Write today!

Pacific SCIENTIFIC CO.

LOS ANGELES: 1430 Grande Vista Ave.
SAN FRANCISCO: 25 Stillman Street
SEATTLE: 421 Michigan Street
PORTLAND: 1218 S.E. 7th Ave.
ARLINGTON, TEXAS: 111 E. Main Street

Representing:
•Automatic Temperature Control Co.
•Cal-Tester
•Coates Electric Co.
•Lewis Engineering Co.
•Link Engineering Co.
•The MB Manufacturing Co.
•Partlow Corporation
•Soiltest Incorporated
•Tinius Olsen Testing Machine Co.
•Wilson Mechanical Instrument, and Helicoid Gage Divisions of American Chain & Cable Co.

. . . for more details, circle No. 67 on Reader Service Postcard

NEW LONDON
"Moto-Belt"
CONVEYOR

- PRODUCTION
- ASSEMBLY
- PACKAGING
- INSPECTION

LOW COST

Hundreds of USES . . .
ADAPTABLE to practically ALL conditions!

BELTS: 2" to 18" wide; White Cotton or Stitched Canvas; Rubber or Neoprene; Plastic or Wire Mesh.

Variable Belt Speeds — Adjustable Stands — Side Rails — 10' sections up to 80' — Steel, Aluminum or Stainless Steel.

Investigate TODAY — Send for Catalog

NEW LONDON ENGINEERING CO.

DEPT. W, NEW LONDON, WISCONSIN

. . . for more details, circle No. 68 on Reader Service Postcard

Handy Pump says:

"STOP waste! . . . dispense liquids from drums, barrels and storage tanks with BLACKMER Hand Pumps"

Blackmer Rotary Hand Pumps

The new Blackmer FR-Master Hand Pumps

liquid materials handling ®

BLACKMER

Industrial, Hand and Truck Pumps, Strainers, Pressure Control Valves

BLACKMER PUMP COMPANY, GRAND RAPIDS 9, MICH.

DIVISION SALES OFFICES — NEW YORK • ATLANTA • CHICAGO
GRAND RAPIDS • DALLAS • WASHINGTON • SAN FRANCISCO

See Yellow pages for your local sales representative

. . . for more details, circle No. 69 on Reader Service Postcard

ALL-HYDRAULIC OVERHEAD CRANE
. . . travels at variable speed under any load

A hydraulic, 3-ton overhead traveling crane has been designed and constructed as an experimental model by Shaw-Box Crane & Hoist. Chief advantage of the crane is that it provides variable speed under any load. It also requires less maintenance than multi-motored electric cranes and costs an estimated 10% less. Power for crane motions is supplied by a single Dudco constant delivery, vane-type hydraulic pump driven by a 10-hp. squirrel-cage-type single speed motor. *Shaw-Box Crane & Hoist Division, Manning, Maxwell & Moore, Inc.*

. . . for more details, circle No. 256 on postcard

TUBE BENDING MACHINE
. . . designed for extended runs

Bendmaster, a tube bending machine designed primarily for extended runs where more than one bend per tube is required, has a self-indexing system which presets the machine for the entire sequence of bends. Tubing remains in the machine throughout the bending process, while automatic stops control tube rotation, angle, degree, and spacing of bends, providing uniformity of finished pieces. The manually-operated machine will handle all ferrous and non-ferrous tubing from ¼ in. to 1 in. O. D. *Leonard Precision Products Co.*

. . . for more details, circle No. 257 on postcard

SULPHURIC ACID
for the west

66° BAUME 20%
98% OLEUM

and special grades

Garfield ESTABLISHED 1916

700 CRANDALL BUILDING
SALT LAKE CITY, UTAH

CHEMICAL & MFG. CORP.

. . . for more details, circle No. 70 on Reader Service Postcard

3,000-LB. CAPACITY FORK TRUCK
. . . has short wheelbase and 360-deg. steering

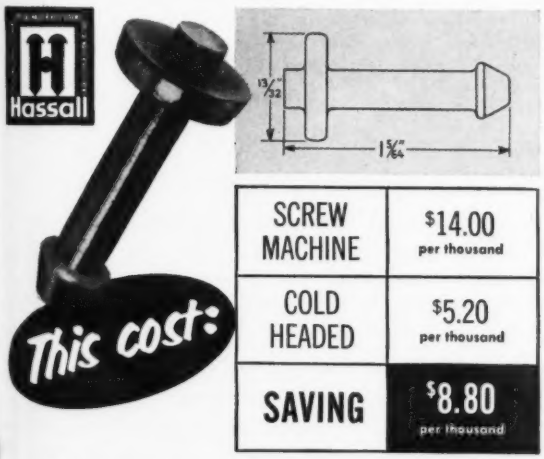
A short wheelbase and 360-deg. steering are features of this 3,000-lb. capacity fork-lift truck, engineered to handle loads in confined areas at maximum speeds. Wheelbase and steering permit maneuvering in narrow aisles and inside truck trailers and box cars. The trucks, which have worm drive, packaged unit assemblies, contactor controls, and a caster-type trial axle, have 3,000-lb. capacity at 24 in. on the 68-in. model and at 20 in. on the 83-in. model. A device is provided on the steering mechanism to prevent steering wheel kick-back. *Elwell-Parker Electric Co.*

. . . for more details, circle No. 258 on postcard

SHATTERPROOF WINDOW PANES
. . . can be nailed into place

A window pane which can be dropped, stepped on, or nailed into place is made of glass fiber reinforced plastic and is available in seven stock sizes. The panes, which come in two colors engineered to give efficient diffused daylighting with minimum eye fatigue, are available in two finishes—smooth both sides or crinkle both sides. *Corrulux Dixision, L-O-F Glass Fibers Co.*

. . . for more details, circle No. 259 on postcard



How about your fasteners or small parts? Have you had an estimate from HASSALL?

This is a typical example of how HASSALL saves thousands of dollars for cost-conscious manufacturers in hundreds of industries. This part is made in one piece by cold heading . . . the part is not only lower in cost but also stronger and just as accurate. Savings amount to $8.80 per thousand and this manufacturer used hundreds of thousands a year!

WRITE FOR CATALOG . . . . . with it we will send you our popular decimal equivalent wall chart.

John Hassall, Inc., Box 2186, Westbury, L. I., N. Y.

HASSALL

SINCE 1850 — NAILS, RIVETS, SCREWS AND OTHER COLD-HEADED FASTENERS AND SPECIALTIES

Los Angeles Representative:
C. W. Warren Co., 646 N. Fuller Avenue, Los Angeles 36, California
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More power from existing conduit

Greater current-carrying capacity of Anaconda Type AB butyl high-voltage cable enables users to transmit the same amount of current with smaller cable . . . or up to 22% more current with the same size cable, when installed in conduit at 40°C ambient temperature. New engineering Bulletin EB-27 gives you full details on performance of Anaconda Type AB insulation in 15 Industry Specification Tests, including operating temperature. Write for your free copy—Bulletin EB-27. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y. 56298 Rev.

SEE THE MAN FROM ANACONDA®
—PIONEER IN BUTYL INSULATION
. . . for more details, circle No. 72 on Reader Service Postcard

What is your sealing problem?

Chances are, one of Presstite's Permagum sealers will solve it!

Permagum sealers are non-staining, non-drying, permanently soft compounds that *seal tight and stay tight.* Their stability at high temperatures, lack of odor, ability to remain soft and pliable at extremely low temperatures, and effectiveness in sealing out moisture, make them particularly suited for refrigeration sealing. However, they are also widely used in automobiles, railroad cars, trucks, trailers, prefabricated houses, aluminum window frames . . . wherever wind, dust, moisture, must be sealed out.

Available in beads, ribbons, tapes, or special shapes for easy application. Call for complete information today.

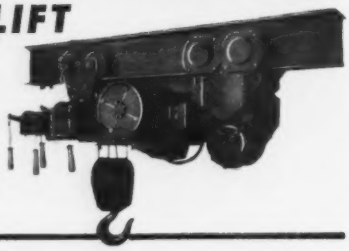
Sealing Compounds by PRESSTITE

THE HUBBARD COMPANY

4809 East 49th Street, Los Angeles 58, California. Logan 8-3136
SAN DIEGO—Glencourt 4-1659 SAN FRANCISCO—Underhill 3-0288
. . . for more details, circle No. 73 on Reader Service Postcard

for top performance and dependability

ELECTROLIFT WORM DRIVE HOISTS



To give you the fastest, smoothest, most efficient materials handling operation, ElectroLift designed the Worm Drive Hoist. Only Worm Drive gives you these four big advantages:

- **Simplified design—longer life with fewer moving parts.**
- **Greater safety factor because of increased braking ability of worm drive.**
- **Noise-free operation.**
- **Greater compactness—close headroom.**

Available in a wide selection of models, speeds, capacities and controls. For complete information, contact your ElectroLift representative listed in telephone directory.

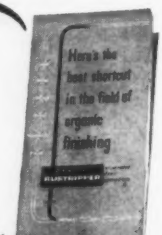
WORM DRIVE ELECTROLIFT HOISTS

3791

ELECTROLIFT, INC., 204 Sargeant Avenue, Clifton, N. J.

. . . for more details, circle No. 74 on Reader Service Postcard

DO PAINT STRIPPERS FAIL TO GIVE YOU A CLEAN STEEL SURFACE?



Here's a new kind of stripper that removes paint, pigments, phosphate coatings, rust and oil. It removes them all in one operation. Leaves nothing but bare, clean steel. Eliminates need for pickling and neutralizing.

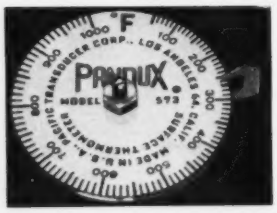
FREE For illustrated booklet "Here's the best shortcut in the field of organic finishing", write Oakite Products, Inc., 1001 E. First St., Los Angeles, or 681 Market St., San Francisco, Calif.

SPECIALIZED INDUSTRIAL CLEANING **OAKITE** MATERIALS · METHODS · SERVICE SCIENCE

Technical Service Representatives in Principal Cities of U. S. and Canada
Export Division Cable Address: Oakite

. . . for more details, circle No. 75 on Reader Service Postcard

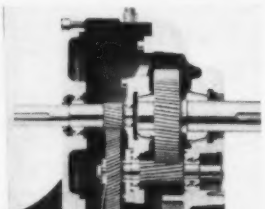
SPOT CHECK SURFACE THERMOMETER
. . . will range as high as 1,000 deg. F.



Temperature of all surfaces, such as dies, hot plates, heavy sheet metal, furnace skins, boilers, steam pipes, etc., can be checked with this surface thermometer, which ranges from 50 deg. F. to 1,000 deg. F. Compact and easy to read, the thermometer will reach stability and register temperature within 60 sec. Diameter is 1¾ in.; weight 1/3 oz. *Pacific Transducer Corp.*

. . . for more details, circle No. 260 on postcard

IN-LINE HELICAL GEAR DRIVES
. . . standardizing your heavy-duty set-ups



A new line of in-line helical gear drives is available from Link-Belt, featuring a high degree of standardization with ability to stand up in heavy duty service. Double reduction drives come in ratios from 6.2 to 1 through 38.4 to 1 with capacities up to 118 hp.; triple reduction drives are available in ratios from 47.1 to 1 through 292 to 1 with capacities up to 20 hp. One-piece cast iron housings with oil seals at shaft openings prevent oil leakage. According to the manufacturer, the line will withstand heavy duty service, has high precision, and operates quietly. *Link-Belt Co.*

. . . for more details, circle No. 261 on postcard

THICK CAST ACRYLIC SHEET
. . . eliminates need for lamination

A clear thick cast acrylic sheet of 5- to 10-in. thickness, eliminates the necessity for laminating to obtain the desired thickness for many applications. The sheets, which are available in 24 x 24-in. sizes, may be used for optical and scale models and prototypes, observation shields, pressure vessels, insulators, and decorative fixtures and displays. *Cadillac Plastic & Chemical Co.*

. . . for more details, circle No. 262 on postcard

Improve Quality of Your Product

with

SORBOCAST

CAST IRON

Dayton Foundry

HOLLYDALE, CALIFORNIA NEvada 6-1251

. . . for more details, circle No. 76 on Reader Service Postcard

TRADE WINDS

News for you about suppliers of plant operating equipment

EXPANSION AND NAME CHANGE was announced by David Brown, Ltd., at a recent dinner meeting. Shown here are **David Brown,** president of the parent firm (seated center); **George Glover,** vice president of newly formed firm (standing); **Fred B. Marsh** (left) and **Allen Avison** (right), members of the parent firm. (See item below.)

David Brown, Ltd. changes name, expands

Plans of the official California corporation of David Brown, Inc., to move to larger quarters, and the addition of one application engineer and a new product were announced at a party held by David Brown (Canada) Ltd., Oakland, Calif. Attending the party were David Brown, members of the firm's board of directors, and some 50 customers, dealers, and other interested persons.

Acting as the basic U. S. sales outlet for gear products manufactured in England, the company is expected to operate under the new trade name as of May 1. Proposed occupancy of new and larger quarters at 999 Beecher St., San Leandro, Calif., is May 1 also. Upon moving, inventories of the firm's Radicon worm reducer will be increased extensively.

Denis Murphy
Application engineer
David Brown, Inc.
Oakland, Calif.

Denis Murphy joined the firm recently as an application engineer for the gear division. Previously serving with Boston Gear Corp. in the San Francisco Bay area, his addition to David Brown, Inc., is the first of a series of staff increases planned.

Also shown at the cocktail-dinner meeting was the firm's new gearmotor which will soon be marketed.

Changes at Yale & Towne in San Francisco office

L. W. Goldenson, former president of Industrial Truck Sales which was San Francisco area representative for Yale & Towne Mfg. Co. prior to establishment of a factory branch outlet last year, has been named manager of the San Francisco sales and service activity by Yale and Towne. He replaces *Harold N. Stiles* who is moving to the company's Philadelphia, Pa., headquarters as acting electric truck sales manager.

San Francisco branch is temporarily located at 563 Second St. Firm has announced plans for a move to more spacious quarters to serve the Northern California area.

Cal-Doran concludes first phase of expansion

California-Doran Heat Treating Co., Los Angeles, has completed the first phase of its $250,000 expansion program, and expects its new facilities to increase production by 40%.

Equipment resulting from the expansion includes a bottom-quenching, controlled-atmosphere vertical heat treat furnace with three-zone control, which makes possible both fabrication and heat treating in the West. A carburizing furnace, sand and vapor blasting equipment, and a brick-lined conveyorized pusher-hearth furnace are also new.

Goodrich to enlarge Los Angeles facilities

B. F. Goodrich Co. has completed plans to move its Los Angeles district operations from East 44th St. to new and larger facilities at Garfield and Slauson Ave. The firm has operated an auxiliary warehouse in Garfield since 1953 and will now add warehouse, office, and lunchroom facilities totaling 49,500 sq. ft.

The new location, which will be occupied about May 1, will have a total of 131,000 sq. ft.

Mallory-Sharon Titanium expands Pacific office

Mallory-Sharon Titanium Corp., producer of titanium and titanium alloys for the aircraft industry, has expanded its Pacific Coast office. New and expanded offices are located at 1418 N. Highland Ave., Hollywood, Calif.

George Denny
Sales manager

Andrew Eshman
Service engineer

Mallory-Sharon Titanium Corp.
Hollywood, Calif.

George Denny, Mallory-Sharon sales representative in Los Angeles since 1952, has been promoted to district sales manager, while *Andrew Eshman,* who is transferring to the Pacific Coast from the company's headquarters in Niles, Ohio, has been appointed district service engineer.

Air Mac Spokane branch represents P&H excavators

The Spokane branch of Air Mac, Inc. of Washington has been appointed franchised dealers for Harnischfeger Corp.'s P&H shovels and cranes. The Milwaukee firm's products will be represented by Air Mac in northern Idaho and in Washington east of the Columbia River.

Harlan Lemmer and *Bill Brokaw,* both with more than seven years background in P&H shovels, have joined Air Mac's organization. *John T. Little,* Jr. manages the Spokane office.

If so, you have a slight idea of the force exerted by one blow of a small Cleveland Bin Vibrator. Just imagine this happening 10,000 times per minute. That's what can be expected from the smallest of our air vibrators, the 1" type F. and if you need real brute force, there are seven larger sizes.

You can see why stuck bins get unstuck in a hurry. The beauty of it is that when properly mounted these vibrators deliver the punch of a stevedor with absolutely no damage to the bin. Write for further details.

Air or Electric

Portable or Permanent

Silent or Standard

Bin Stuck Lately?

THE CLEVELAND VIBRATOR COMPANY

1914 Clinton Ave. • Cleveland 13, Ohio
7 Front Street • San Francisco, Calif.

. . . for more details, circle No. 77

Betz firm opens Northwest district

Consultants on industrial water treatment problems, *W. H. and L. D. Betz,* have opened district offices at 1823 Eighth Ave., Seattle, Wash. *R. E. Myers,* formerly serving with

R. E. Myers
District Engineer
W. H. & L. D. Betz
Seattle, Wash.

the firm as service engineer in the San Francisco offices, is the new district engineer. He will serve the two-state area of Oregon and Washington, which was formerly served from San Francisco offices. He is replaced in San Francisco by *R. L. Noble.*

Westinghouse division names new Kalispell distributor

Sturtevant Division, Westinghouse Electric Corp., has named the industrial supply division of Forest Products Co. as its distributor in Kalispell, Mont. The division will handle small air handling, heating, and ventilating products, including industrial fans, ventilating sets, and speedheaters.

Automatic Switch appoints Valvate distributors

Automatic Switch Co. of Orange, N. J., has appointed Valvate-Associates, Huntington Park, Calif., as distributors for Asco solenoid valves.

Titanium Metals moves Western sales office

Titanium Metals Corp. of America has announced that the new office of *J. F. Boand, Jr.,* manager of sales for the Western district, will be located at 6465 Corvette St., Los Angeles.

Bolt Beranek opens Los Angeles office

Bolt Beranek & Newman, Inc., acoustical consulting firm in Cambridge, Mass., has opened a West Coast office in Los Angeles. Services of the firm, which provides acoustical consultation in all fields, range from isolating machinery noises or redesigning noisy motors and ducts to complex audiometric test rooms and anechoid chambers.

Pacific Scientific named Claud Gordon distributor

Pacific Scientific Co., Los Angeles, has been named West Coast distributor for Claud S. Gordon, Chicago, thermocouples and thermocouple accessories. Pacific will stock thermocouple wire, heads, connectors, protection tubes, and thermocouple lead wires.

Pacific Metals appointed Wilson sales representative

H. A. Wilson Co., Union, N. J., has appointed Pacific Metals Co., Ltd., San Francisco, as its sales representative for Ni-Span C, a constant-modulus alloy used by instrument and electronic firms and aircraft and guided missile manufacturers. Pacific Metals operates in California, Arizona, Utah, and Nevada.

Kaiser Steel appointed Yale West Coast depot

Fabricating division of Kaiser Steel Corp. has been appointed as the West Coast depot for Yale & Towne Mfg. Co.'s electric hoists. Yale points to the increasing industrial importance and growth of the West Coast area as its reasons for the appointment.

Arwood Precision joins Investment Casting Institute

Arwood Precision Casting Co., Brooklyn, N. Y., has joined the Investment Casting Institute in Chicago. The institute, which provides for the interchange of information among its members and to industry in general, is composed of 48 producers of precision-made parts utilizing the investment casting process.

Baldwin-Lima appoints Hall-Perry distributor

Baldwin-Lima-Hamilton Corp.'s construction equipment division, Lima, Ohio, has appointed Hall-Perry Machinery Co., with offices in Butte, Billings, and Great Falls, Mont., distributor for the Lima line of shovels, cranes, draglines, and pull shovels. Hall-Perry will distribute throughout most of Montana.

Torkmaster uses wagons to demonstrate unit

Torkmaster Division, Harvill Corp., Los Angeles, and Torkmaster distributors are using station wagons to demonstrate the division's valve operating unit to customers. Torkmaster estimates that each mobile unit rolls

up more than 35,000 mi. annually in its demonstration work.

The wagons enable the units to be speedily-transported, allowing more customers and prospects to see demonstrations than would be possible otherwise. Each wagon contains full-scale working model of the valve operating unit.

Nevada Neon appointed Filon distributor

Nevada Neon & Supply Co., Las Vegas, has been appointed a distributor for Filon Plastics Corp., El Segundo, Calif. Nevada Neon will be equipped with factory trained personnel to service dealers, architects, and contractors, and will stock the complete line of Fiberglas plastic panels.

KSM Products opens San Francisco office

KSM Products, Inc.'s, stud welding division, Merchantville, N. J., has opened a district office at 1615 Polk St., San Francisco. *F. G. Kern* has been assigned to the West Coast office and will represent the company as district engineer in California.

Automatic Molding names Coast Plastics distributor

Automatic Molding Machine Co., Los Angeles, manufacturers of the Automold high-speed automatic compression molding machine, has appointed West Coast Plastics Distributors, Inc., Culver City, Calif., as distributors for the Southern California territory.

MEN OF THE TRADE IN THE NEWS . . .

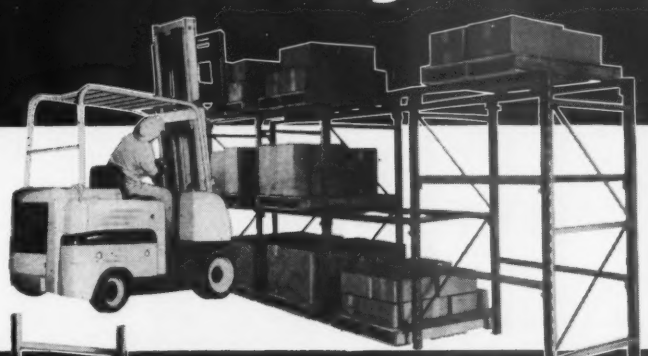
Fulton Sylphon Division, Robertshaw-Fulton Controls Co.

. . . appoints *David D. Gordon* sales manager for the Los Angeles district, replacing *W. J. Hajek*, who has been transferred to Chicago. Gordon will be responsible for the sale of Fulton Sylphon's products in California, Washington, and Oregon. He has been with the company for 13 years, serving as coordinator of research and supervisor of the original equipment division.

Fort Worth Steel & Machinery Co.

. . . promotes *Gene Margro*, former Pacific regional manager, to the new post of

New! STURDI-BILT Adjustable Storage Racks



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to make any type rack for PALLETS — SKIDS — DIES

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Exclusive "Floating Wedge Lock Construction" (patents pending) produces a structure of unparalleled rigidity. Enables you to assemble, expand or relocate your racks at any time without tools or special labor.

INSTANTANEOUS REARRANGEMENT
Openings may be respaced in a matter of seconds.

ALL PARTS INTERCHANGEABLE
Always usable — no parts loss.

SINGLE OR DOUBLE WIDTH OPENINGS. HEIGHTS TO FIT YOUR NEEDS

LET *ONE* RACK SERVE ALL YOUR NEEDS
Supplementary parts permit multiple rack uses without *any* structural changes.

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manager of the specialized machinery division. He will headquarter in Fort Worth. *Joe Temblador*, former district manager in Los Angeles, succeeds Margro as Pacific regional manager, directing design and sales of the company's specialized machinery, including feed mill equipment and oil mill machinery.

Link-Belt Co.

... appoints *Donald L. Shirley* Pacific Northwest sales manager, an advancement from his former post of district sales manager for Seattle. He will have responsibility for sales in Washington, Oregon, parts of Idaho and Montana, and Alaska, and will continue his headquarters at company plant in Seattle.

Emsco Manufacturing Co.

... brings into its organization, as sales manager of swivel joint division, *H. J. Schlarb*, who for past eleven years has been associated with Chiksan.

Drake Steel Supply Co.

... names *Richard A. Probert* operations manager in San Diego. *Billy Mowbray*, former credit manager in Los Angeles, is assigned to the post of merchandise manager and assistant to Branch Manager George Morgan in Fresno, while *Max van Dordrecht* takes over as credit manager in Los Angeles.

Columbia Wax Co.

... names *H. N. Farthing*, former assistant sales manager, as sales manager. Farthing, who will have his headquarters in Glendale, Calif., joined the floor care products manufacturing company five years ago as a sales representative.

Superweld Corp.

... appoints *Tom Caffo* sales representative in Southern California. He has been with this North Hollywood firm since 1954, last serving as production control foreman.

Gaylord Container Corp.

... makes following appointments in its Pacific Coast sales organization: *Paul Westernoff* becomes Pacific Coast division manager, with headquarters at Oakland. *Don Harnish* is appointed sales manager for Los Angeles territory. *James H. Oliver, Jr.*, is promoted to assistant sales manager at Los Angeles. *Bernard L. Smith* advances to assistant sales manager for Northern California. *George E. Washburn*, who has been in Los Angeles sales office for many years, will now act in advisory capacity and contact many major accounts in Southern California.

United Air Lines

... appoints *Homer E. Morley* district sales manager in San Francisco, heading sales and promotional activities. Promoted from assistant district sales manager, Morley joined United in 1943 as a salesman in Los Angeles.

Rucker Co.

... transfers *Donald A. Anderson* from San Francisco to position of district application engineer for Los Angeles area. His past experience with Rucker has been in field of industrial hydraulic applications. *James M. Ayers* joins company as sales engineer for San Francisco and Peninsula territory. He was last with Minneapolis Honeywell Corp. as district manager of transportation division.

Heald Machine Co.

... appoints *Charles H. Shaefer* as Western representative for its internal and rotary surface grinders and Bore-Matics. Shaefer, who will headquarter in the Los Angeles office of the Worcester, Mass., firm, will be responsible for sales areas in California, Arizona, Colorado, Utah, Washington, and Oregon.

Cummins Service & Sales, Inc.

... promotes *Gene Power* to sales assistant to Vice President S. B. Cook in Los Angeles and *W. O. Jones* from office manager to field representative.

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Superweld Corp.

. . . appoints as sales engineer for Southern California *C. R. Van Scoy*, who prior to joining this company owned and operated Lafayette Metal Products, Inc. Superweld, with offices in North Hollywood, specializes in copper furnace brazing and nickel alloy brazing.

. . . adds to its staff *William E. Hibbard* in new position of application engineer. He was formerly a field engineer for Fabriform Metals of Los Angeles and, prior to that, with Bergstrom Alloys Corp., Los Angeles.

Reynolds Metals Co.

. . . transfers *John Clearwater* from Portland to Seattle, where he replaces *Richard N. Peters* as Northwest division sales manager. Mr. Peters now moves to San Francisco as new division sales manager in that office. Mr. Clearwater's former position was aluminum conductor sales representative in Northwest.

M and M Wood Working Co.

. . . names *E. W. Baxter* as sales manager for new Malarkey Plastics division at Portland, Ore., covering territory of Idaho, Oregon, Montana, Washington, and Northern California. Before joining M and M, he was Northwest district sales manager for Drackett Products Co. and, earlier, was associated with Gerber Products Co.

Flexible Tubing Corp.

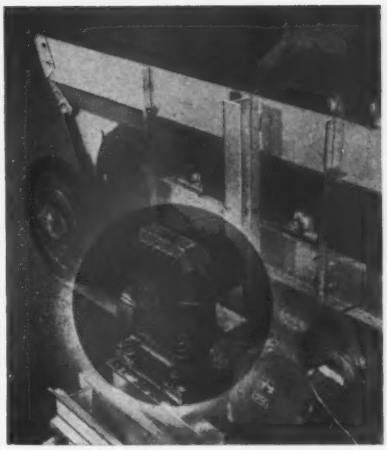
. . . names *Walter C. Burns* to post of manager of Western operations, with headquarters at Los Angeles plant. Mr. Burns was formerly sales manager of industrial rubber products division of Pioneer Rubber Mills, San Francisco. In his new post he will direct sales activities throughout the eleven Western states for Flexible Tubing, which has its main plant in Guilford, Conn.

Heat and Control, Inc.

. . . adds *Jack W. Cameron* to its sales and engineering staff at its San Francisco main office. He has previously been with Surface Combustion Corp., Standard Alloys Co., and Natural Gas Equipment, Inc. *W. H. Bingham* also joins company, specializing in Askania Regulator Co. product service on West Coast. He was formerly with Navy submarine service.

Aluminum Co. of America

. . . appoints *Warren Van R. Gilbert* assistant manager of forging sales, working out of Vernon, Calif., plant. For the past year he has been assigned to Washington district sales office. He has been with Alcoa since 1926, for a part of that time as manager of a World War II forge plant and, later, a permanent mold foundry.



190 ft., 60 in. belt-type log sorting conveyor

RADICON
Speed Reducer

Keeps Logs From Sleeping in Paper Mill Wood Room

A modern paper mill depends on the log conveyor to feed the entire mill operation — continuously! The all-important speed reducer must be rugged, reliable and efficient.

That's why fan-cooled Radicons, like the model 10 RHU (ratio 60:1) in the above mill installation, are being specified. Using a 15 hp motor at 1,800 rpm, the Radicon output shaft delivers a powerful 29 rpm — at 80% efficiency.

Check the installation. It is a good example of the Radicon extra roller bearing amply accommodating a small diameter (10 in. P. D.) chain sprocket... greatly reducing the cost of chain drive.

The 10 RHU Radicon sells for $595.00 — immediate delivery. Packaged drives supplied by authorized David Brown factory branches and distributors:

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San Francisco-Oakland: George M. Philpott Co., Inc.
Seattle, Washington: Cascade Machinery Co.

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FACTORY BRANCH
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Gear Products for: paper and pulp mills, chemical plants, mines, food processors . . . conveyors, hoists, agitators, screens, deckers, filters, canning machines, and other industrial equipment.

DB(G)-2

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West Coast Division
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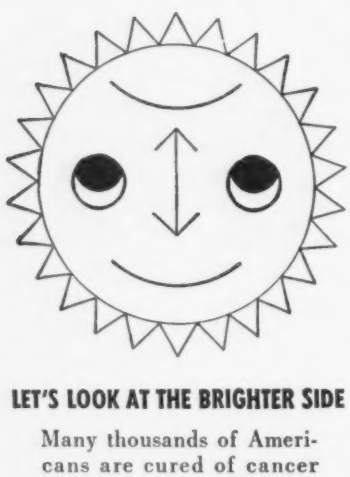


LET'S LOOK AT THE BRIGHTER SIDE

Many thousands of Americans are cured of cancer every year. More and more people are going to their doctors *in time*...To learn how to head off cancer, call the American Cancer Society or write to "Cancer" in care of your local Post Office.

American Cancer Society

Corrulux Division L-O-F Glass Fibers Co.

. . . appoints *Richard C. Schofield* sectional sales manager for West Coast area, with offices in Burbank. For the past several months, he has been working with regional sales manager in Midwest area. In his new capacity he will cover states of California, Arizona, Utah, Nevada, Idaho, Montana, Oregon, and Washington.

Carpenter Steel Co.

. . . appoints *R. W. Titgemeyer* assistant branch manager of the Los Angeles territory. He joined Carpenter, which has its main office in Reading, Pa., as sales engineer in the Los Angeles area in 1947. He headquarters at the company's Mill-Branch warehouse.

Bristol Co.

. . . appoints *L. Robert Steele* as its new socket screw field representative in Northern California, Oregon, and Washington, with offices in San Francisco. He was formerly with Republic Steel Corp. in this area.

Welding Fittings Corp.

. . . names *Howard W. McNutt* as its Western district sales manager, with newly established sales office in Los Angeles. Company's headquarters are New Castle, Pa.

Stauffer Chemical Co.

. . . promotes *James H. Begley* to post of Western division sales manager for industrial chemicals. He moves to San Francisco from Chicago, where he has been district sales manager.

Chainveyor Corp.

. . . appoints *Edward P. Russell* as field service engineer in Western region. He last held post of consultant engineer with Merendino and Greene Engineering Co., Pasadena.

Formsprag Co.

. . . expands its sales force with appointment of *Kenneth M. Kraska* to post of district manager for West Coast. His offices will be in Los Angeles, covering California, Arizona, Washington, and Oregon. Mr. Kraska joins Formsprag, which has its home office in Van Dyke, Mich., from Winter Bros. Co., where he last held post of West Coast district sales manager.

Kalman Floor Co.

. . . appoints *George Kresa* as new sales engineering representative in Los Angeles area. He was formerly in civil engineering field in Chicago area.

Thor Power Tool Co.

. . . names *C. B. Baron*, former electric tool service engineer and electric tool division manager, as West Coast zone manager for its Los Angeles, San Francisco, and Seattle territories. He will headquarter in Los Angeles.

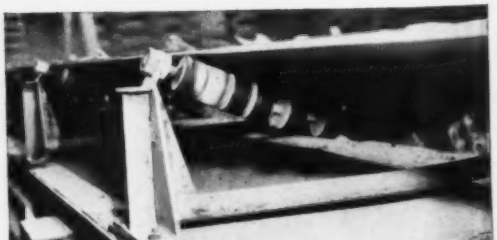
Fruehauf Trailer Co.

. . . names *V. H. Knowles* as its Pacific Coast division sales manager. A former vice president of Autocar Co., until its merger a year ago with White Motor Co., he has been serving as manager of Southern California and Arizona district for White.

(Advertisement)

FLEXIBLE, 2-BEARING IDLER

cuts belt conveyor maintenance 90%



Still on the go after 3 "no-down-time" years handling abrasive foundry sand—that is the record of a unique belt conveyor idler. Other installations include successful handling of sticky, corrosive triple super phosphate and fertilizers, potash, wet concrete mix, hot coke, coal, sticky iron ores, trap rock, with up to *twelve times* the service life of former idlers on the same jobs. Resilient discs on a flexible steel cable, the Joy "Limberoller" has only 2 bearings, up out of the dirt. It conforms to the load, cushions and guides belt; needs no lubrication. It resists dust, abrasion, corrosion and material buildup—thus avoids fouled bearings; minimizes chemical and mechanical wear. Available for belt widths of 18″-42″. **Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario. Bulletin 39-17*

. . . for more details, circle No. 86 on Reader Service Postcard

Le Roi Division, Westinghouse Air Brake Co.

. . . appoints *Thomas E. Stone* Mountain Region field representative in Utah, eastern Idaho, and Western Colorado. Stone, who joined Le Roi in 1947 as a service trainee, makes his headquarters in Salt Lake City.

Narmco Industries

. . . appoints *R. V. Van De Vanter* technical sales engineer for Narmco Resins & Coatings Co., Costa Mesa, Calif., manufacturers of Metlbond structural adhesives and resin impregnated fabrics. He rejoins organization after some time with Orchard Industries in Michigan. His earlier association was with Narmco Manufacturing Co. in San Diego.

Pacific Coast Engineering Co.

. . . advances *Jack P. Tepley* to position of general sales manager of company in Alameda. Former assistant general sales manager, he replaces *John F. Martin*, who has joined company's Southern California representative. Pacific Coast Engineering produces custom-built machinery and equipment.

Consolidated Freightways
Portland, Ore.

Louis Caffar moves up from post of Eastern division superintendent to newly-created vice presidency, responsible for moving and warehouse, heavy hauling and tanker divisions and subsidiaries. He has been with company since 1939.

Stanford Research Institute
Menlo Park, Calif.

Dr. Jesse E. Hobson, director of SRI, submits resignation effective March 31, 1956. He was appointed to this post in March 1948, following four years as director of Armour Research Foundation in Chicago, Ill.

Narmco Manufacturing Co.
San Diego, Calif.

Dale H. Black is elevated to newly created post of assistant to president, an advancement from technical sales manager. *Carey Carpenter*, former process control engineer, becomes production manager in charge of manufacturing operations at San Diego and La Mesa plants.

Hooker Electrochemical Co.
Tacoma, Wash.

George A. Gentes, former plant engineer, moves up to position of assistant works manager at Tacoma plant of this company, which has main offices in Niagara Falls, N. Y. *Robert M. Sherwin*, who joined company in 1951 as a chemical engineer, is named assistant plant engineer.

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TUBULAR RIVETS
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OTHER PLANTS IN MILFORD, CONN.; HATBORO, PENNA.; AURORA, ILL.; ELYRIA, OHIO

. . . for more details, circle No. 87

WESTERNERS AT WORK

Autoette
Long Beach, Calif.

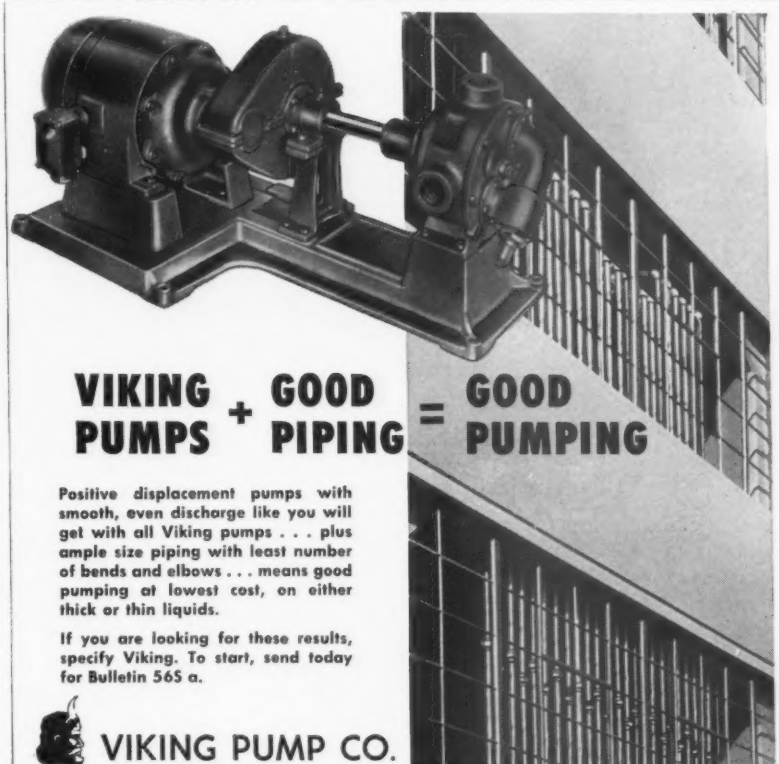
J. H. Tuttle is appointed plant manager of this company, acquired in November by principals of Wayne Manufacturing Co. of Pomona, Calif. For past two years he has been in consultation work; earlier, he was associated with Kalamazoo Manufacturing Co. of Kalamazoo, Mich., Research Engineering Co., and several automotive manufacturers.

Chrysler Corp.
Los Angeles

Harold E. Kingsbury is appointed chief engineer of West Coast operations for this company, with headquarters at Los Angeles plant, where he will be responsible for all product engineering. Since 1951 he has served as resident engineer there.

ElectroData Corp.
Pasadena, Calif.

Raymond Meyer is named supervisor of manufacturing, advancing from position of administrative assistant to vice president. His present position, a newly created one, covers responsibility for production, purchasing, plant maintenance, and production and materials control.



Positive displacement pumps with smooth, even discharge like you will get with all Viking pumps . . . plus ample size piping with least number of bends and elbows . . . means good pumping at lowest cost, on either thick or thin liquids.

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. . . for more details, circle No. 88 on Reader Service Postcard

CLASSIFIED SECTION

Space is sold as advertisers' inches. All advertisements in this section are ⅛ inch short of contracted space to allow for borders and composition. Rates are $9.00 a column inch. Copy should be sent in by the 25th of preceding month if proofs are required; by the 28th if no proofs are required.

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Drayer-Hanson, Inc.
Los Angeles

C. W. Pollock rejoins this air conditioning and refrigeration manufacturer as chief engineer, commercial division. Formerly vice president and chief engineer in that division, he left the company in 1951 to form his own dealership in Seattle. Prior to his return to Drayer-Hanson, he was regional sales manager for Trion, Inc., of Pennsylvania.

Rucker Co.
Oakland, Calif.

William E. Muther

William E. Muther is named to position of manager of manufacturing and estimating for this company, which specializes in hydraulic and pneumatic control components and machinery. Before joining Rucker he was chief engineer of Oakland Machine Works, in charge of design and production of hydraulic and mechanical machinery. Before that, he held post of senior mechanical engineer for Pacific Coast Engineering Co.

Crown Zellerbach Corp.
San Francisco

R. R. Edwards, former vice president in charge of manufacturing for Canada, is transferred from Vancouver, B. C., to San Francisco headquarters of this company, as manager of bag and bag paper production. His successor in Vancouver is *R. J. Schadt*, former resident manager at St. Helens, Ore., who is replaced by *R. A. Dupuis*, former assistant mill manager at Camas, Wash. *J. M. Miller*, plant engineer at Camas, becomes manager of engineering.

AiResearch Manufacturing Div. Garrett Corporation
Los Angeles

Richard E. Palmer

Richard E. Palmer is appointed assistant manager of division, which manufactures aircraft accessories. He was formerly manager of contract administration, and is succeeded in that position by *James F. Gardiner*, who joined company about a year ago.

Lovequist Engineering Co.
Los Angeles

Rudolph Hallberg is named general manager of this aircraft parts and machine tool manufacturer. He was previously purchasing agent of C. M. Harrison Restaurant Co., Chicago, and has also been with Western Electric, American Telephone and Telegraph, and Zenith Radio.

Borg-Warner Corp.
Los Angeles

A. W. Rose, vice president, is named vice president and general manager of company's petro-mechanics research division, North Hollywood. He replaces *Ernest L. Black*, who is now with Technicolor Motion Picture Corp.

Consolidated Freightways
Portland, Ore.

Max R. Jensen, former superintendent of transportation, is named to a newly-created vice presidency, responsible for operations, including transportation, safety, terminal operations, claims, communications, and maintenance. He has been with company for 26 years.

Rheem Manufacturing Co.
Downey, Calif.

Robert H. King becomes assistant plant manager of Downey aviation plant. He was formerly division industrial engineer and joined company in 1951.

Kaiser Steel Corp.
Oakland, Calif.

A. F. Scarr is appointed assistant to *Jack L. Ashby*, vice president and general manager of Kaiser Steel Corp. Mr. Scarr has been with Kaiser since 1946, for the past three years as assistant to vice president of operations.

Chainveyor Corp.
Los Angeles

Frank G. Birkhead is appointed chief engineer at Los Angeles plant. He was formerly director of automation research for International Latex Corp., Dover, Del. Former chief engineer, *Arne T. Hilland*, has been named to head field service engineering office in Newark, N. J., and former plant superintendent, *C. L. Long*, now heads field office at Flint, Mich.

Consolidated Chemical Industries, Inc.
Bayshore, Calif.

A. L. Stephenson is promoted to assistant plant manager of animal glue factory at Bayshore operated by this New York chemical producer. Mr. Stephenson joined company in 1933, and before his transfer to California was in charge of maintenance at Ft. Worth, Tex., acid plant.

Consolidated Engineering Corp.
Pasadena, Calif.

Fred J. MacKenzie is named chief purchasing agent for transducer division, an advancement from post of assistant director of purchases.

Western Paper Products Division Central Fibre Products Co.
Salt Lake City, Utah

Burton A. Kraus succeeds *Landon M. Persons* as general manager of division. Mr. Kraus moves to Salt Lake City from Denver, where he has served as head of paper mill owned by company. Mr. Persons has advanced to coordinator of ten company box plants, with his offices in Quincy, Ill.

Terminal Flour Mills Co.
Portland, Ore.

Henry J. Schmitt becomes new vice president and general manager, replacing *Fritz Dubus*, who recently resigned. Mr. Schmitt has been with Colorado Mill and Elevator Co., Denver, and earlier with Preston-Shaffer Milling Co., Walla Walla, Wash.

THE West ON ITS WAY

NEW PLANTS, EXPANSIONS, NEW INDUSTRIES, PRODUCTION CONTRACTS, DEVELOPMENT PROJECTS, UTILIZATION OF RESOURCES

HIGHLIGHTS . . . read details under state headings

Motorola plans $3,000,000 addition to Phoenix facilities (p. 101)

Container manufacturing operation planned by Crown Zellerbach (p. 101)

New $40,000,000 Mercury plant for Ford in LA area (p. 101)

Fibreboard will spend $3,000,000 for Antioch plant and equipment (p. 101)

Utah engine production plant planned by Marquardt Aircraft (p. 101)

General Petroleum to construct buildings in Santa Fe Springs (p. 102)

Big Beech Aircraft plant rumored for Boulder, Colo. (p. 106)

Western Kraft plans $5,000,000 expansion at Albany, Ore. (p. 107)

$73,500,000 plant and equipment expansion planned at Boeing (p. 107)

ARIZONA

$3,000,000 ADDITION — Motorola, Inc., plans a $3,000,000 addition to its military electronics engineering, research, and production facilities in Phoenix. Laboratory and manufacturing space will be brought to 325,000 sq. ft. with the addition of the 150,000-sq. ft. building, which will be built on a 160-acre site.

CALIFORNIA

CONTAINER PLANT—Crown Zellerbach Corp. plans to build a corrugating and container manufacturing operation adjacent to its kraft paper mill now under construction at Antioch. The $2,500,000 unit will mark the firm's entry into container manufacturing on the Pacific Coast. The 175,000-sq. ft. building will be occupied in early 1957. Crown Zellerbach also purchases a 33.55-acre tract in Portland, Ore., for a 400,000-sq. ft. warehouse to cost over $2,000,000.

ELECTRICITY FROM ATOMS—AEC authorizes Atomics International, division of North American Aviation, Inc., and the Edison Co. in Southern California, to negotiate a contract in connection with the Atomics International experimental reactor near Santa Susana. With this authorization Edison can proceed with plans for installation and operation of generating equipment there which will produce electrical energy from heat developed by the reactor.

LIGHTING FIXTURES—Thomas Industries, Inc., Louisville, Ky., opens a lighting fixture plant in the Santa Fe Central Manufacturing District of Los Angeles. New plant and showroom replaces the company's present plant in Los Angeles and will be the West Coast headquarters for the firm's Moe Light Division and Star Lighting Fixture Co., a subsidiary.

JACKSON CONSTRUCTS — Byron Jackson Division of Borg-Warner Corp. begins construction on a 65,000-sq. ft. electronics plant in Santa Ana. The $1,000,000 project, to be located on a 40-acre site, includes a main plant and office building, and an electronics environmental testing laboratory.

BUILDS NEW PLANT — Fibreboard Products, Inc., plans to spend $3,000,000 for a 260,000-sq. ft. plant and new equipment to increase the corrugated case capacity of its Antioch plant. Expansion will be completed by June.

MERC PLANT FOR LA—Ford Motor Co.'s Mercury div. will construct a $40,000,000 assembly plant at Rosemead in the Los Angeles area. Plant will be about 1,400,000 sq. ft. in size. According to Ford, J. H. Pomeroy & Co., San Francisco contractors who built the Ford Milpitas plant, expect to complete the plant by April, 1957.

RODDIS PURCHASES — Roddis Plywood Corp., Marshfield, Wis., purchases Western Cooperage Co., Portland, Ore., and certain timber reserves from California Barrel Co. in Arcata, for $12,000,000.

MARQUARDT EXPANDING — Marquardt Aircraft Co., Van Nuys, plans to build a ram-jet engine production plant near Ogden, Utah, a test plant near Great Salt Lake, and expand its plant in Van Nuys.

The West On Its Way
appears monthly in

Western Industry

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IBM EXPANSION—International Business Machines Corp.'s multi-million dollar West Coast expansion includes a 13-story office building and data processing center in Los Angeles (above) scheduled for mid-1957 completion. IBM immediately occupies a six-story office building in San Francisco, and completes occupation of another office building in Santa Monica. Data processing centers in Portland and Seattle will be installed in March and June, respectively. Expansion program also includes manufacturing, engineering, and education facilities in San Jose.

LETS CONTRACTS—Lockheed's Missile Systems Division lets first contracts for design and construction of its research laboratories at Palo Alto. To be completed by Sept. 1, the laboratories, located on a 22-acre site in Stanford University's industrial park, are part of a $20,000,000 expansion program.

PLANS THREE BUILDINGS—General Petroleum Corp., Los Angeles, plans to construct three buildings in Santa Fe Springs at a cost of $500,000 to house the southern division production department, production engineering and equipment section, gas department, and production and gas laboratories.

GROUND BREAKING—General Mills breaks ground for the Sperry Division's Larro Sure-Feed mill in Stockton. The six-story mill building will have three floors with 4,200 sq. ft. and three floors with 2,100 sq. ft. A one-story warehouse will adjoin the mill.

CONSTRUCTS SHOP—Augustine Brass Casting Co., Stockton, will construct a new shop and office estimated at $20,000.

MOVES OFFICES—Frank A. Bellato and staff moves its offices to 816 E. Hazelton Ave., Stockton. Firm manufactures process equipment for the food, paper, and chemical industries.

INVESTORS PURCHASE—A group of San Francisco investors, management engineers, and sales executives purchases Portable Air Cooler & Heater, Inc., San Francisco, and Chico Air Cooler Distributors, Chico. Portable manufactures Chico portable evaporative coolers; Chico Distributors handles the marketing. Alf E. Werolin is the new president of Portable, while Daniel C. Cutter is vice president, and David Keyston secretary-treasurer.

IMPROVES TERMINAL—Tide Water Associated Oil Co. improves its bulk product terminal in San Francisco by demolishing most of the present structure and replacing it with more modern facilities to make product storage and distribution more efficient. Additional storage space will be built on the 129,000-sq. ft. plot, bigger pipelines put in, and a new truck loading rack constructed.

BUYS ACREAGE — Marvin Kratter, New York real estate investor, purchases 281 acres in Kearny Mesa Industrial Center in San Diego. Property is available for development and construction as a center for electronic, atomic, and other light manufacturing.

TRANSIT SHED—Port of Los Angeles will build a $1,000,000 ocean cargo transit shed on the site of Matson Navigation Co.'s leased passenger-cargo marine terminal. Funds for the transit shed, which will be used for processing about $1,000,000 worth of commodities monthly, will be advanced by Matson.

NEW BUILDING—C. E. Swift Roofing Co. will construct a new office and warehouse building at 1930 W. Oak St., Stockton, costing about $18,000.

ADDS WELDING—Expanding its facilities to about 50,000 sq. ft., Modglin Co. installs a complete welding department in its metals working division. Al Wiese heads the metals division, which expands to meet defense production requirements.

PRODUCES MISSILES—Air Force and Navy have given Ryan Aeronautical Co. contracts worth $4,000,000 for production of jet-powered Firebee Drone missiles. Contracts extend production to the latter months of 1957.

ESTABLISHES LABORATORY—Beckman Instruments, Inc., establishes the Shockley Semiconductor Laboratory to develop and produce transistors and other semi-conductor devices in the field of advanced electronics for automation. Heading the laboratory is Dr. William Shockley, inventor of the junction transistor. Temporarily quartered at Mountain View, Shockley and his research team will move to the Beckman research and development center in Stanford Industrial Park when the facility is completed in August.

ELECTRONIC FIRM—Wilson Electronics Co., an electronic equipment manufacturing, research, and development organization, is formed in Sacramento. Company will initially build high-fidelity music reproducing equipment and test equipment for servicing television receivers, while it does research in the fields of instrumentation and audio reproducing systems.

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Lufkin, Texas
Jan. 3 (MTX)*

V. J. Fawcett

L. A. "Pete" Little, Lufkin's Vice-President in Charge of Sales, was standing in the lobby of the Angelina Hotel at Lufkin, and while witnessing the invasion of his sales force in this East Texas stronghold, Pete talked to Tee Hunter, the hotel manager, and said, "Tee, what you see fills us with glee, for these are our boys from far away places and overseas."

Switching from iambic pentameter to just plain prose, Pete explained further to an out-of-town woodsman-oilman that Lufkin started every new year off this way, and for about a week, management meets with the sales force in daily sessions to review the year's progress and to lay plans for the coming year.

And, as Pete's pride unfolded, they kept drifting in—**Oklahoma's** dynamo, Doug Reid, followed by Rick Muller, then there were the **Rocky Mountain** lads—Bob Miller and Jack Read, of **Denver** and **Casper**, respectively.

New York City's export expert, Si Simonson, arrived on the scene, and without missing a hand, shook his way through a score of grinning greeters.

Gulf Coast "go-getters," Bill Miner and Tom Bowers were not far behind, and by this time the joint was really jumping.

But still they came, shedding their snowshoes, from **Canada**, there were genial Jack Gissler, from **Edmonton**, and rangy Bob Dunlop, from **Regina**.

Just then a loud noise was heard, and, sure enough, Pan-Am had successfully completed delivery of our **South American** rep., little Benny Sargent.

Lew Breeden, outfitted in boots and hat, made it in from **Effingham**, but had to move fast. "Gangway, reinforce the deck," Pete cried. "Here comes Captain Caraway, the **Dallas** dreadnaught."

With all hands accounted for, the Annual Sales Conference was soon underway. **Pacific Coast Division** associates are agreed this meeting was the most successful ever. Thanks to the acceptance and preference of Lufkin products by our customers everywhere for making such a meeting possible.

Collectively we have a common target—to bring to industry the finest equipment, backed by service, unexcelled, anywhere.

*MTX—Mule Train Express.

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ACQUIRES RUBBER FIRM—Stillman Rubber Co., Culver City, acquires Extruded Products Co., Fullerton, producers of extruded rubber products for aircraft and building industries. Stillman will operate the firm as the Extruded Products Division.

OCCUPIES NEW BUILDINGS—Solar Aircraft Co., San Diego, occupies a new engineering office building and engineering test laboratory for research in gas turbine engines.

COMPLETES EXPANSION — Norris-Thermador Corp., completes a $600,000 expansion of its vitreous china plumbingware plant near Puente. Plant has 85,000 sq. ft. and will produce lavatories, toilet bowls, and tanks, as well as doing laboratory research and testing work.

ACQUIRES DIVISION—General Controls Co., Los Angeles, acquires the precision potentiometer division of Electro Circuits, Inc., Pasadena. Division will operate as an independent unit.

AVIATION CONTRACTS — Rheem Mfg. Co., Los Angeles, receives two aviation contracts totaling $7,500,000. Under a $5,460,000 contract from North American Aviation, Inc., Rheem will supply major components for F-100 Super Sabre jet fighters. Second contract is from the Air Force.

FIRST SHIPMENTS—Stauffer Chemical Co. makes first shipments of pelleted mixed fertilizer from its new plant in Vernon.

ADDS SPACE—Zep Aero, manufacturer of high altitude breathing equipment, constructs additional office and laboratory space in El Segundo. The 2,000-sq. ft. addition will include a completely equipped laboratory.

MOVES PLANT — Bekins Industrial Packaging, a division of Bekins Van & Storage Co., Los Angeles, moves into new processing and packaging plant in Hawthorne. Plant contains a five-car siding, loading dock, packaging and processing building, fabricating and box making building, and administration facilities.

DAM GATE CONTRACT—Ordnance division of Food Machinery & Chemical Corp., San Jose, is awarded a $500,000 contract for 74 giant dam gates for The Dalles Dam on the Columbia River in Oregon.

BUYS INTEREST—Robert H. Collins, former vice president of Gaines-Collins, Los Angeles, purchases the interest of Frank Gaines in the company and forms Collins Machinery Corp. Firm makes automatic pipe threading and cutting machines.

BUILDS PLANT—Donner Scientific Co. plans to build an air conditioned plant on a 10-acre site in Concord. The 22,000-sq. ft. structure, scheduled for June completion, will house the company's engineering laboratories, manufacturing facilities, and administrative offices.

FULLER BUYS STOCK—Fuller Co., Catasauqua, Pa., acquires all outstanding stock of Sutorbilt Corp., Los Angeles., manufacturer of positive pressure blowers, pneumatic conveyors, fans, material feeders, and related products. Fuller will manufacture certain of its products for West Coast delivery at Sutorbilt.

FORMS COMPANY—Rappaport Construction Co., with temporary headquarters in Torrance, is formed by Herman H. Rappaport, to serve industry in construction involving reinforced concrete and mechanical engineering projects.

MOVES FACTORY—Autoette, electric car manufacturer, moves its factory from Long Beach to Pomona. Another factory of 30,000-sq. ft. is under construction in Pomona for the Autoette production line.

ESTABLISHES FACILITIES — B. F. Goodrich Co. establishes technical staff and principal facilities for the production of fuel cells in Los Angeles. Company appoints J. Terry Taylor manager of fuel cell operations and David L. Haines technical manager of fuel cell design and engineering.

PLANS CONSTRUCTION — Griffin Wheel Co., Chicago, will construct a plant in South Colton for the manufacture of railroad car wheels. Plant will employ 150 to 200 workers and will be in operation in about a year.

NEW BUILDING—Lenkurt Electric Co., San Carlos, plans 90,000-sq. ft. administration and engineering building to be designed by Frank Lloyd Wright and located near present Lenkurt headquarters.

ACQUIRES BATTERY FIRM—Nic-L-Silver Battery Co., Santa Ana, acquires assets of Battery Products Corp., Oakland. The Oakland facility, which has a 50,000-sq. ft. plant, will produce the Nic-L-Silver battery line.

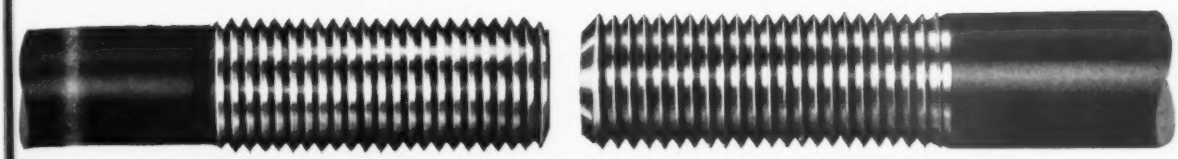
COMPLETES ADDITION — Barber-Webb Co., Los Angeles, completes a $100,000 addition to its facilities in Vernon. Addition includes a 4,000-gal. capacity tank for the PVC plastisol dipping operation, and materials handling bridge crane system.

KAISER PRODUCTION—Kaiser Gypsum Co., Inc., begins production at the first unit of its Antioch gypsum products plants, four months after groundbreaking. Unit will have an annual capacity of 94,000,000 sq. ft. of gypsum board products.

L.O.F. DOUBLES—Through the leasing of a 15,000-sq. ft. building, and a 75x200-ft. lot in Burbank, L.O.F. Glass Fibers Co. doubles its plant facilities. Original plant adjoins the newly acquired properties.

ACQUIRES WRENCHES—Plomb Tool Co. acquires certain assets of Tubing Appliance Co., Inc., including machinery, tooling, patents, and inventories of ratchet wrenches. Addition of the TAC line expands Plomb's coverage of hand tools for industry to some 200 items.

ROLLED or CUT THREADS?



Answers to questions we're often asked

Q. What is the important difference between cut and rolled threads?

A. A rod with a cut thread has an outside thread diameter which is the same as the body of the rod. Also, the end of the rod is usually pointed to remove the sharp starting thread.

Rolled threads have an outside diameter greater than the diameter of the portion of the rod next to the thread. And the end of the thread need not be pointed because a sharp starting thread is not present on a rolled thread.

Q. Which type of threads is better?

A. That's hard to say. But rolled threads are often the better choice. There are several reasons:

1. In many instances, rolled threads are cheaper. This is true because of the weight savings. You buy less steel. Also, rolled threads can often be produced faster. The savings to the customer on the larger sizes is often substantial.

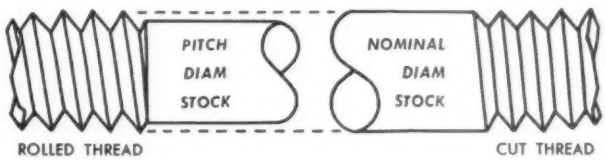
2. Rolled threads are likely to be smoother. And because cold-working hardens the threads, they are not as easily damaged. The cold-working also develops compressive stresses in the threads, making them more resistant to fatigue from repetitive stresses in bending or tension.

3. Because the thread-rolling process "cold-works" the steel in the threads, rolled threads have a slightly higher tensile strength than cut threads. This advantage, however, diminishes as the diameter of the rod or bolt increases.

Q. How can I be sure that rolled threads are the best choice for a particular application?

A. Just phone our nearest sales office and one of our threaded product engineers will gladly give you sound advice. If your job calls for a special fastener, we'll get quotations for you quickly from one of our three West Coast plants.

Here are the facts. The table below compares various standard rod sizes and shows the weight savings possible when rolled threads are used instead of cut threads.



COARSE THREAD Size	ROLLED THREAD STOCK diam in.	ROLLED THREAD WEIGHT lb/ft	CUT THREAD STOCK diam in.	CUT THREAD WEIGHT lb/ft	WEIGHT SAVINGS pct	STRESS AREA sq in.	MINIMUM BREAKING LOAD* lb
¼-20	0.214	0.122	0.250	0.167	**26.9**	0.0318	2050
⅜-16	0.330	0.291	0.375	0.376	**22.6**	0.0775	5050
½-13	0.445	0.529	0.500	0.668	**20.8**	0.1419	9200
¾-10	0.680	1.235	0.750	1.502	**17.8**	0.334	21700
1 - 8	0.914	2.231	1.000	2.670	**16.4**	0.606	39400
1¼- 7	1.153	3.550	1.250	4.172	**14.9**	0.969	63000

*Minimum breaking load for cut threads is based on ASTM Spec. A-306 Grade 65 which has a minimum tensile of 65,000 psi. Breaking loads for rolled threads of the same grade will be slightly higher. For other grades of steel, breaking load of cut or rolled threads is in proportion to the tensile strength of the steel.

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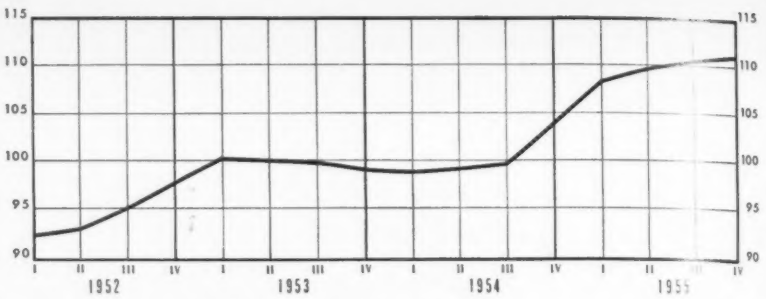

WEST'S RISING BUSINESS CURVE—Index of business activity in the eleven Western states, prepared by the Western home office of Prudential Insurance Co. of America, Los Angeles, continued to rise during the fourth quarter of 1955. Increase was 0.7% above that of the third quarter of 1955, 7.4% over the fourth quarter of 1954. Manufacturing payrolls continued to climb, with aircraft industry one of the strongest elements in the Western economy. Construction activity remained stable; engineering contracts awarded were up 22%.

LARGEST ORDER—Lockheed Aircraft Corp., Burbank, receives the largest order ever placed by the U. S. Navy for WV-2 early warning radar planes. The $60,000,000 order extends production of the planes through December 1957.

BUYS FIRM—Packard-Bell Co., Los Angeles, buys Technical Reproductions, Inc., and will operate the firm as a department of Packard-Bell's technical products division.

DIVISION BUILDING—Standard Products Co., Cleveland, Ohio, producer of metal and rubber products, will start construction on a 50,000-sq. ft. plant on a six-acre site in Fullerton for its West Coast division. The project, scheduled for August 1 completion, will cost about $500,000.

PURCHASES FIRM—Haws Drinking Faucet Co., Berkeley, purchases Kramer Mfg. Co., San Francisco, manufacturers of flush valves. Firm will be known as Kramer Flush Valve Division of Haws.

COLORADO

PUBLIC SERVICE CONSTRUCTS—Public Service Co. of Colorado will spend $27,400,000 for new construction in 1956, with most of the money spent in the Denver metropolitan area. Biggest item is the Cherokee steam generating station.

ACQUIRES EBERHART—Morse Chain Co., subsidiary of Borg-Warner, acquires Eberhart-Denver Co., Denver, and its affiliate, Spreco Co., Chicago. Eberhart produces speed reducers.

AWARDED CONTRACT—Aviation division of Sundstrand Machine & Tool Co., which is building a factory in Denver, is awarded a $3,827,025 air force contract covering part of the cost of basic production machinery and equipment for the plant, which will manufacture constant speed alternator drives for aircraft.

PURCHASES PLANES—National Airlines, New York, plans to purchase 20 Lockheed Electra turbo-jet airplanes at a cost of $46,000,000. Purchase is part of a $100,000,000 expansion program.

PURCHASES SITE—Purchase of a 50-acre site southwest of Denver for construction of a new plant to expand its structural glazed tile capacity is made by Robinson Brick & Tile Co., Denver. Costing approximately $185,000, the new facilities will supplement the present Robinson plant.

BRANCH PLANT — Beech Aircraft Corp. reportedly plans a multi-million dollar branch plant at Boulder and is negotiating for purchase of 600 acres in the area.

IDAHO

ISSUE SPECIFICATIONS — Westinghouse Electric Corp. issues drawings and specifications for the construction of site facilities for the prototype of a large ship nuclear propulsion plant at the National Reactor Testing Station near Arco. Work will cost about $1,800,000.

NEVADA

SIGNS OPTION—Johns-Manville Corp., New York, signs an option on a gypsum deposit in Southern Nevada, and is considering entering the gypsum business. Deposit is located between Las Vegas and Henderson.

OREGON

ACID PLANT—Chipman Chemical Co., Inc., will start construction in Portland on a plant to make basic 2,4-D acid. Expansion is estimated at about $1,000,000.

BUYS FIRMS—Consolidated Freightways, Portland, buys rights and equipment of R. A. Conyes Tank Line, San Pablo, Calif., and operates the petroleum carrier as a separate division. Consolidated also agrees to exchange 60,000 shares of its common stock for all stock of Gallagher Freight Lines, Denver, carrier of general commodities in Colorado, Wyoming, Utah, and Montana.

DOUBLES CAPACITY—Western Kraft Corp. plans an expansion of its kraft pulp and linerboard plant near Albany, doubling its present capacity of 120 tons of linerboard a day. Expansion will cost close to $5,000,000 and will get underway sometime during 1956, with completion scheduled for mid-1957. Western Kraft's plant is the first in Oregon to use only wood chips left over from sawmill and plywood operations as raw material; firm will buy chips from additional mills when expansion is complete.

PLANS TO BUILD—Oregon Metallurgical Corp. plans to build a titanium metal reduction plant in Albany. It would be the first of its kind in the Northwest.

DOUBLE CAPACITY—Oregon Portland Cement Co., Portland, starts construction on a $3,114,572 plant in Lime to double its production capacity and bring its output to about 1,000,000 bbl. of finished cement annually.

WASHINGTON

BOEING BLOOMS AGAIN — Boeing Airplane Co. plans an estimated $73,500,000 expansion of plants and equipment, all of which will be spent during the next three years. Plans call for a $20,000,000 research and development center 1,021,000 sq. ft. in four buildings, a $9,000,000 expansion of the Renton plant, production and engineering tool and equipment purchase amounting to $8,700,000, a $2,600,000 missile research expansion, $2,450,000 more for jet tanker-transport equipment support, $2,000,000 for advance bomber phase I requirements, $1,400,000 for work at Renton field positions, construction on a supersonic wind tunnel requiring $1,350,000. Known expansion plans awaiting board approval amount to another $26,000,000.

COMINCO BUILDS — Cominco Products, Inc., plans to build a $1,000,000 fertilizer storage plant in Spokane Valley. The 240,000-sq. ft. building will store 50,000 tons of bagged fertilizer, have facilities for storing liquid fertilizer, and equipment for conversion of anhydrous ammonia to aqua ammonia.

BUILDS REFINERY—Texas Co. plans to construct a refinery in Anacortes with a capacity of 30,000 bbl. a day.

FORMALDEHYDE PLANT — Borden Co.'s chemical division begins construction of a $1,000,000 formaldehyde plant in Kent.

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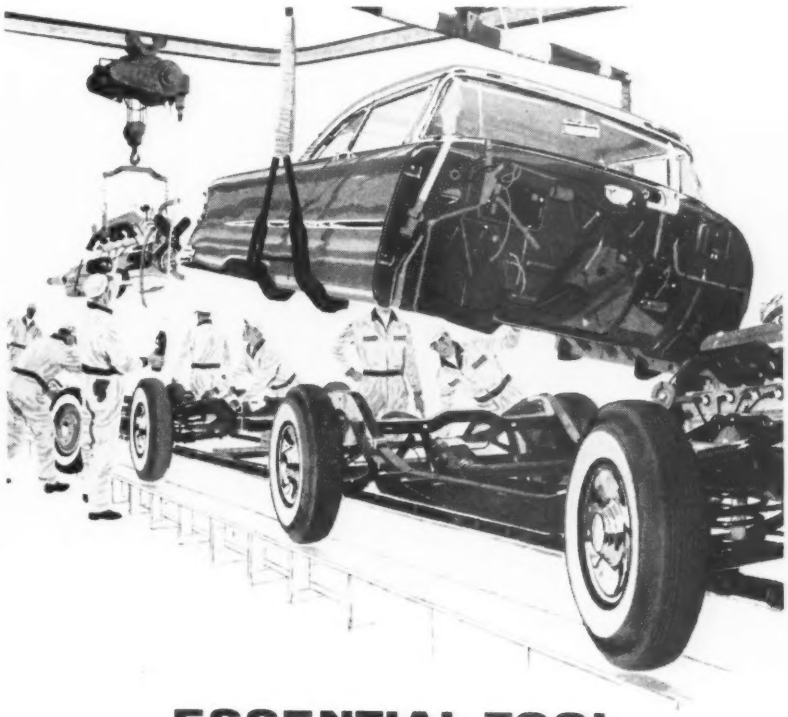

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ADVERTISERS in the March 1956 WESTERN INDUSTRY

A

Acme Steel Company 14
Alan Wood Steel Company 26
Allis-Chalmers Mfg. Company
Construction Machinery Division 35
Allmetal Screw Products Company, Inc. 97
American Blower Corporation
Subsidiary of American Radiator &
Standard Sanitary Corporation 32
American Brake Shoe Company
AmForge Division 21
Anaconda Wire & Cable Company
Subsidiary of Anaconda Copper
Mining Company 91
Aro Equipment Corporation 83
Arwood Precision Casting Corp. 79

B

Bethlehem Pacific Coast Steel Corporation 105
Blackmer Pump Company 90
Brown, David, (Canada) Limited
U.S.A. Pacific Branch 97
Buffalo Forge Company 54
Byers, A. M., Company 11

C

Caine Steel Company of California 61
California Bank, Los Angeles 107
California Physicians' Service (Blue Shield) 69
Calstrip Steel Corporation 75
Clark Equipment Company ..... Cover 3
Cleveland Vibrator Company 94
Cold Metal Products of California ..... Cover 4
Coldwell, Banker & Company 102
Columbia-Geneva Steel Division
United States Steel Corporation ..... 33 & 71
Columbia Wax Company 16
Consolidated Freightways, Inc. 87
Copperweld Steel Co.
Ohio Seamless Tube Division 17
Crane Co. 81

D

Dayton Foundry 92
Dempster Brothers, Inc. ..... 8 & 9
Denison Engineering Company, The 28 & 29
Diamond Chain Company, Inc. 50
Dodge Manufacturing Corporation 18
Du Pont, E. I., De Nemours & Co., Inc.
Finishes Division 53

E

Electrolift, Inc. 92
Eutectic Welding Alloys Corp. 64
Evans Rule Co. 66

F

Fabriform Metal Products 77
Falk Corporation, The 24
Fernholtz Machinery Company 82
Foster, L. B., Co. 96

G

Garfield Chemical & Manufacturing Corp. 90
Garrett Supply Co.
Division of Garrett Corp. 13
General Appraisal Co. 98
General Petroleum Corporation 7
Globe Hoist Company 23
Great Lakes Carbon Corporation
Dicalite Division 86

H

Hancock Mfg. Co. 84
Hassall, John, Inc. 91
Hough, Frank G., Co., The 27
Hubbard Company, The 91

I

Industrial Wire Products Corporation 78

J

Johnson Gear & Mfg. Co. 88
Johnston, A. P., Co., Inc. 108
Joy Manufacturing Company 98

K

Kay-Brunner Steel Products Co.
Casting Division 59
Kingwell Brothers 62

L

Linde Air Products Co.
Union Carbide & Carbon Co. 73
Louden Machinery Company, The 15
Lufkin Foundry & Machine Co. 104

M

Martin, Glenn L., Company 5
Mathews Conveyer Company 63
Milford Rivet & Machine Co. 99
Milwaukee Electric Tool Corp. 22
Monarch Rubber Company, The 3

N

National Carloading Corporation 103
National Supply Company
Industrial Products Division 25
New London Engineering Company 90
Nutting Truck & Caster Co. 96

O

Oakite Products, Inc. 92
Ohio Seamless Tube Division
Copperweld Steel Company 17

P

Pacific Scientific Company 89
Pacific Telephone and Telegraph Co. 70
Perin, Ira G., Co. 72
Petley, Inc. 84

R

Reeves Pulley Division
Reliance Electric & Engineering Co. 12
Revere Copper & Brass Incorporated 48 & 49
Ridge Tool Company, The 31
Rust-Oleum Corporation ..... Cover 2
Ryerson, Joseph T., & Son, Inc. 36

S

Sierra Drawn Steel Corporation 97
Standard Conveyor Co. 78
Standard Horse Nail Corporation 88
Standard Oil Company of California 19
State Tube Corporation 70
Stephens-Adamson Mfg. Company
Engineering Division 6
Sturdi-Bilt Steel Products 95
Surety Rubber Company 86

T

Tapecoat Company, The 60
Tuthill Pump Company 74

U

United Air Lines 85
United States Steel Corporation
Columbia-Geneva Steel Division ..... 33 & 71

V

Victor Equipment Co. 34
Viking Pump Company 99

W

Western Industry 106
Wisconsin Motor Corporation 76

Y

Yuba Manufacturing Co. 76

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90
96
92
17
89
70
72
84
12
8 & 49
31
Cover 2
36
97
78
88
19
70
6
95
86
60
74
85
3 & 71
34
99
106
76
76

, INC.
eles 58
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1956
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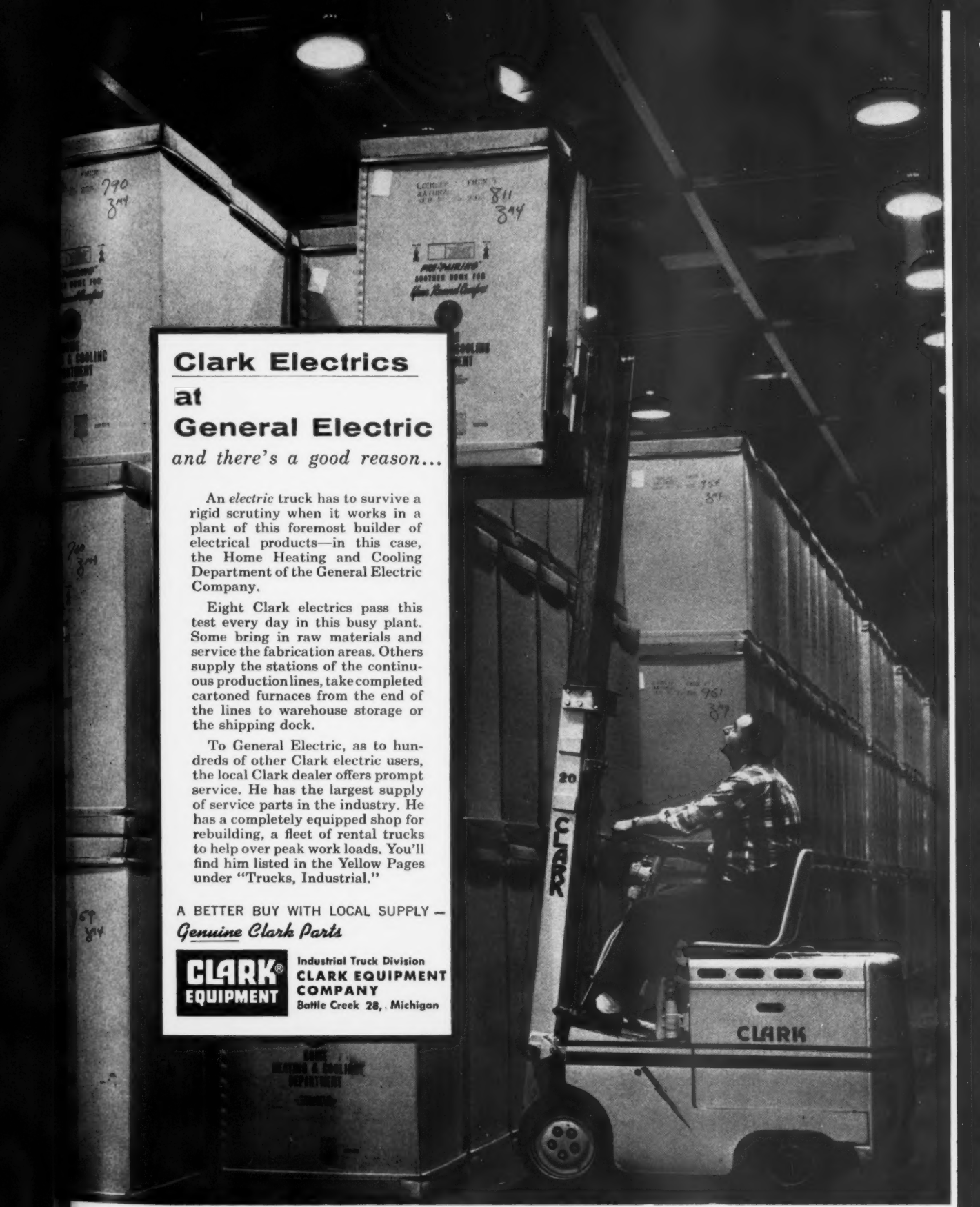

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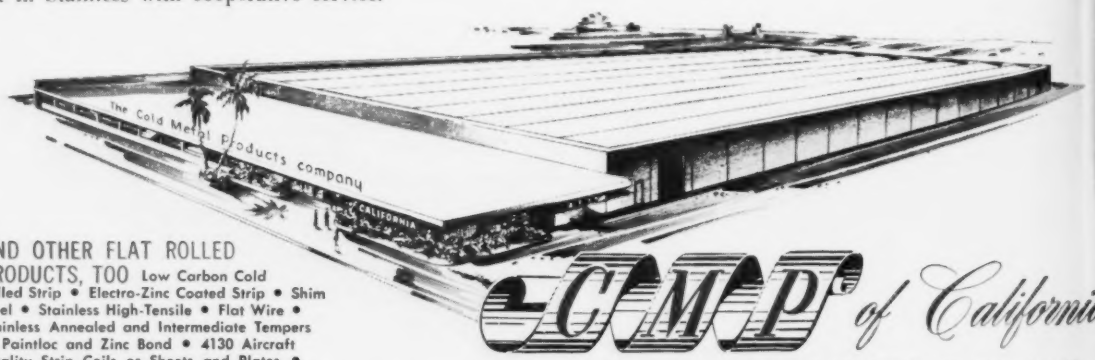

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